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Pony Revision on Unit 1 – Lesson 1

Metals and Nonmetals

First Week

1 Complete the following sentences:

1. The outermost energy level of metals contains ..... four electrons, while that of nonmetals contains ..... four electrons.
2. Element (A), with its outermost energy level (M) containing two electrons, is a ....., while element (B), with its outermost energy level (L) containing six electrons, is a .....
3. All metals are solids, except for ....., which is a liquid.
4. All nonmetals are bad conductors of electricity, except for ..... , which is a good conductor of electricity.
5. Some nonmetals are solid materials, such as ..... ; gaseous materials, such as .....; and the only liquid is .....
6. The atoms of solid metals are arranged in a structure known as ..... .
7. The metallic bond is formed due to the attraction between the positive ..... of a metal and the cloud of valence negative ..... surrounding it.
8. The bronze alloy is composed of ..... at 5% and ..... at 95%.
9. The bronze alloy is used in manufacturing ..... and .....
10. The bronze alloy is characterized by being ..... than copper and ..... to rust.

2 Cross out the odd word, and then write the relation between the remaining words:

1. Gold – Silver – Bromine – Mercury (.....)

.....

2. Phosphorus – Bromine – Mercury – Sulfur (.....)

.....

3. Graphite – Bromine – Phosphorus – Sulfur (.....)

.....

4. Iodine – Sulfur – Carbon – Hydrogen (.....)

.....

5. Bronze – Chlorine – Copper – Tin (.....)

.....

3 How do you differentiate between each of the following:

1. Phosphorus and iron, in terms of:

a. Metallic luster **b.** Malleable and ductile

c. Conductivity of heat and electricity

d. Melting point

P.O.C	Phosphorus	Iron
a. Metallic luster	.....	.....
b. Malleable and ductile	....	....
c. Conductivity of heat and electricity	....	....
d. Melting point	....	....

2. Sodium and graphite, in terms of:

a. Metallic luster **b.** Which one is opaque

P.O.C	Sodium	Graphite
a. Metallic luster	.....	.....
b. Which one is opaque?	.....	.....

3. Sulfur and copper, in terms of:

a. Malleable and ductile **b.** Which one is more brittle?

P.O.C	Sulfur	Copper
a. Malleable and ductile	....	....
b. Which one is more brittle?	.....	.....

4. Silver and phosphorus, in terms of:

Conductivity of electric current

P.O.C	Silver	Phosphorus
Conductivity of electric current	....	....

4 What is meant by each one of the following:

1. Metallic bond

2. Alloy

3. Recycling

5 What is the benefit of recycling metal wastes?

6 If elements (A & B) have melting points of (1538˚C & 115.21˚C) respectively, answer the following questions:

1. What is the type of each one of them? And why?

2. Which one of them is a good conductor of electricity?

3. Which one of them is malleable and ductile?

7 Complete the following table that shows some materials & their properties.

You can choose the color from the following words bank:

(Black – Colorless – Yellow – Waxy white – Silver – Red)

Element	Type	Physical State	Electric Conductivity	Color
1- Oxygen	.....	.....	.....	.....
2- Gold	.....	.....	.....	.....
3- Carbon	.....	.....	.....	.....
4- Bromine	.....	.....	.....	.....
5- Nitrogen	.....	.....	.....	.....
6- Mercury	.....	.....	.....	.....
7- Phosphorus	.....	.....	.....	.....

8 Give reasons for the following:

1. Calcium ($_{20}$Ca) is a metal, while Chlorine ($_{17}$Cl) is a nonmetal.

.....

.....

2. Carbon is used in the manufacture of dry cells although it is a nonmetal.

.....

.....

3. Calcium ($_{20}$Ca) is harder than sodium ($_{11}$Na).

.....

.....

4. A bronze alloy is used in the manufacture of medals instead of copper.

.....

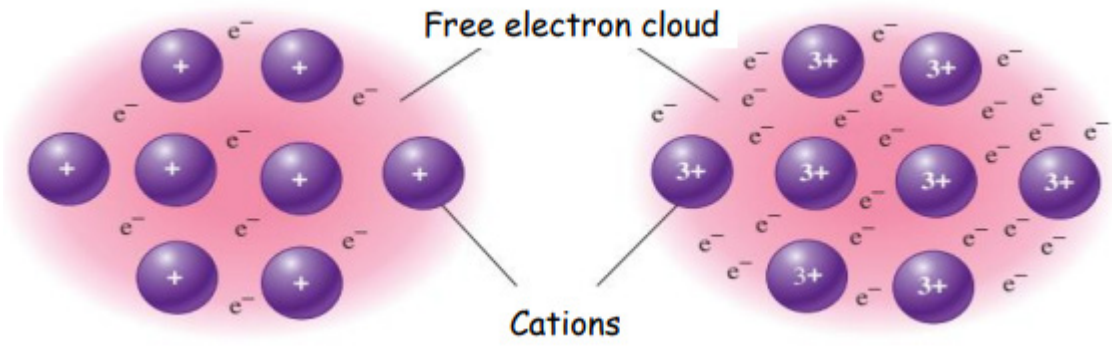
.....

9 What happens if we knock on a piece of graphite?

.....

.....

10 **The following figure shows a bond between two different elements:**



1. What are the types of the two elements in the figure? And why?

2. What is the valency of each?

3. What is the type of bond in both of them?

4. Which is stronger in terms of the bond? And why?

5. What happens if we increase the number of valence electrons in the metal atoms according to the metallic bond?

6. What happens if we mix molten gold with molten copper?

Pony Revision on Unit 1 – Lesson 2

Acids and Alkalis

Second and Third Weeks

1 Complete the following sentences:

1. The scientist ..... clarified that acids are substances that dissolve in water and produce ....., while bases, when dissolved in water, produce .....
2. The molecular formula of the carbonate group is ....., while the molecular formula of the sulphate group is .....
3. Oxygenated acids are those that contain ..... element, such as ..... and .....
4. Non-oxygenated acids don't contain ..... element, such as ..... and .....
5. The number of hydrogen atoms in an acid molecule is equal to the charge of the ..... that forms it.
6. The number of hydroxide groups in a base molecule equals the charge of the ..... that forms it.
7. Lactic acid provides the muscles with ..... during a lack of oxygen, and its accumulation in the muscles causes .....
8. The molecular formula of acids starts with a positive ..... cation, and their names are associated with the ..... in their composition.
9. The molecular formula of alkalis (bases) ends with a ....., and their names are associated with the ..... in their composition.
10. The molecular formula of alkalis (bases) that contain a cation Ca^{-2} is .....
11. The total charge of molecules of any compound equals .....
12. The stomach secretes ..... acid, which helps in .....
13. Lemon and ketchup are considered ..... substances, while toothpaste and baking soda are considered ..... substances.

14. When hydrochloric acid dissolves in water, it produces a ..... ion and a ..... ion.
15. When magnesium hydroxide dissolves in water, it forms a ..... ion and a ..... ion.
16. Acids react with alkalis to form ..... and .....
17. Nitric acid is considered from ..... acids, while nitrous acid and sulfurous acid are considered from ..... acids.
18. Metals burn in the presence of oxygen gas, forming ....., and most of them are known as ..... oxides.
19. Nonmetals burn in the presence of oxygen gas, forming ....., and most of them are known as ..... oxides.
20. The dissolution of sulphur trioxide (SO_3) in water forms .....
21. Dissolving ..... in water forms magnesium hydroxide.
22. The combustion of fossil fuels produces oxides of ..... and .....

2 How to differentiate between:

1. The bicarbonate group and the sulphate group, in terms of the number of charges they carry - the molecular formula.

P.O.C	Bicarbonate group	Sulphate group
a. The number of charges they carry	.....	.....
b. The molecular formula	.....	.....

2. Sulphuric acid and calcium hydroxide, in terms of the molecular formula.

P.O.C	Sulphuric acid	Calcium hydroxide
The molecular formula	.....	.....

3. Sulphurous acid and sulphuric acid, in terms of the molecular formula.

P.O.C	Sulphurous acid	Sulphuric acid
The molecular formula	.....	.....

4. Acidic oxides and basic oxides,
according to the definition - the result of their dissolution in water.

P.O.C	Acidic oxides	Basic oxides
a. Definition	.....	.....
b. The result of their dissolution in water	.....	.....

5. Sulphurous acid and sulphuric acid,
according to the molecular formula - strength and weakness.

P.O.C	Sulphurous acid	Sulphuric acid
a. The molecular formula	.....	.....
b. Strength and weakness	.....	.....

3 Give one example of each of the following:

1. A positive atomic group.

.....

2. A non-oxygenated acid that forms an anion in a liquid state.

.....

3. An acid secreted by the stomach.

.....

4. An oxygenated acid that carries three negative charges.

.....

5. An acid secreted by the muscles.

.....

6. A weak acid.

.....

7. A strong acid.

.....

8. A strong alkali.

.....

9. A weak alkali.

.....

10. A metallic oxide.

.....

11. A non-metallic oxide.

.....

4 Write the chemical formula for the following compounds:

1. Hydrosulphuric acid (.....)
2. Hydrobromic acid (.....)
3. Sulphurous acid (.....)
4. Phosphoric acid (.....)
5. Ammonium hydroxide (.....)
6. Hydrochloric acid (.....)
7. Sulphuric acid (.....)
8. Nitric acid (.....)
9. Potassium hydroxide (.....)
10. An atomic group consisting of three elements (.....)
11. Nitrous acid (.....)

5 Write the names of the following chemical compounds and state their type:

1. H_2SO_4 (.....) (.....)
2. H_2CO_3 (.....) (.....)
3. HCl (.....) (.....)
4. HNO_2 (.....) (.....)
5. MgO (.....) (.....)
6. SO_3 (.....) (.....)
7. $Mg(OH)_2$ (.....) (.....)
8. H2S (.....) (.....)

9. H_3PO_4 (.....) (.....)

10. NaCl (.....) (.....)

6 What is meant by each of the following:

1. Atomic group

2. Acids

3. Alkalis

4. Acidic oxides

5. Basic oxides

6. Acid rains

7 What is the benefit of each of the following:

1. Stomach acid

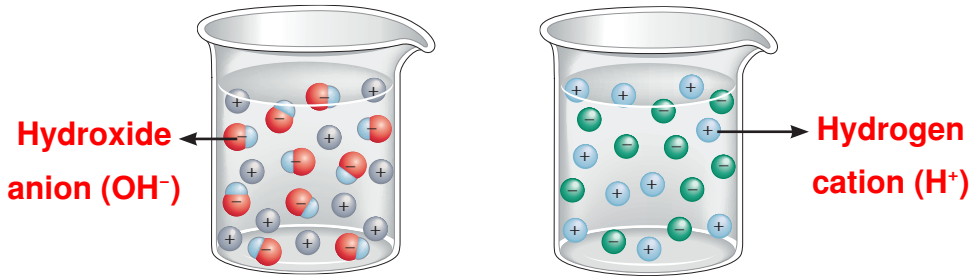
2. Lactic acid

3. Milk of magnesia

4. Litmus paper

8 Study the following figures, and then answer the questions below:

The two figures show two compounds, one alkaline and the other acidic.



1. Which is acidic and which is alkaline?

2. Which of them results from the dissolution of a nonmetal and which results from the dissolution of a metal?

3. What is the result of adding the first tube to the second tube?

4. How do you differentiate between them with a litmus strip?

9 Study the following figures, and then answer the questions below:

The two opposite figures show two alkali compounds, which are sodium hydroxide and ammonium hydroxide.

1. Write the chemical formula for each of them.

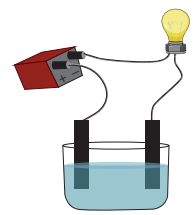


Figure 1

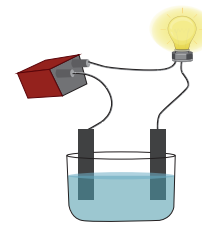


Figure 2

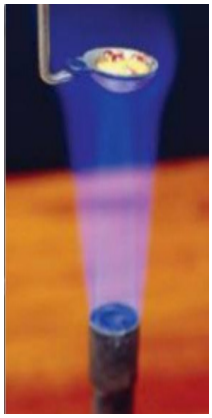
2. Which one of them is weakly alkaline? And why?

3. Which one of the two figures represents (NaOH)?

10 Study the following figures, and then answer the questions below:

The two figures show the combustion of two elements:

Combustion of a magnesium ribbon



Combustion of sulphur crystals

1. Which is a metal and which is a nonmetal?

2. What is the result of combustion of each of them?

3. How do we differentiate between them through practical experience?

11 Give reasons for the following:

1. Acids turn the blue litmus paper into red.

2. Alkalis turn the red litmus paper into blue.

3. Milk of magnesia is used to treat stomach acidity.

12 What happens when:

1. An electric current passes through sulphuric acid and acetic acid, according to the lighting of the lamp?

2. Acids are mixed with alkalis?

3. You heat a piece of magnesium, and then add water to the product?

4. You heat a piece of sulphur?

5. You add water to the previous product?

6. You put a blue litmus paper in the solution?

7. Sulphur oxide is dissolved in rain water?

13 Mention the damages caused by acid rains.

Pony Revision on Unit 1 – Lesson 3

Chemical Indicators and Salts

Fourth Week

1 Complete the following sentences:

1. ..... are chemical substances that change their color in an acidic medium compared to a basic medium, such as .....
2. Distilled water has a neutral effect and does not change the color of the litmus strip due to the equal number of ..... ions with ..... ions.
3. There are many indicators, such as litmus strip and .....
4. We reduce soil acidity by adding ..... materials, such as .....
5. The pH value of acids is ..... than 7, while the pH value of ..... is greater than 7.
6. The pH value of a table salt solution (sodium chloride) is .....
7. The pH value is accurately measured by using a device called .....
8. Acidic gases include ..... and .....
9. Basic gases include .....
10. Neutral gases, which do not affect a litmus strip, include ..... and .....

2 Cross out the odd word, and then write the relation between the remaining words:

1. Universal indicator strips – Litmus paper – Voltmeter – pH meter

(.....)

.....

2. N_2 – H_2O – H_2 – HCl (.....)

.....

3. SO_2 – Cl_2 – CO_2 – NH_3 (.....)

.....

4. HNO_3 – H_2SO_4 – H_2O – HCl (.....)

.....

3 How do you differentiate between each of the following:

1. Distilled water and hydrochloric acid in two ways

P.O.C	Distilled water	Hydrochloric acid
a. By litmus indicator	.....	.....
b. By pH meter	.....	.....

2. CO_2 and O_2 gases

P.O.C	CO_2	O_2
a. By a wet litmus strip	.....	.....

3. Ammonia gas and nitrogen dioxide gas

P.O.C	Ammonia gas	Nitrogen dioxide
a. By a wet litmus strip	.....	.....

4 Give one example of each of the following:

1. A gas that turns the blue litmus strip into red. .....

2. A gas that turns the red litmus strip into blue. .....

3. A gas that has a neutral effect on the litmus paper. .....

4. A chemical indicator that measures the pH accurately. .....

5 What is meant by each one of the following:

1. Indicators

.....

.....

.....

2. Universal indicator

3. pH value

6 Answer the following questions:

1. If you have nitric acid and nitrous acid:
   1. Write their molecular formula.
   2. Which one is strong and which one is weak?
   3. How do you differentiate between them?

2. If you have two compounds (A) & (B) and their pH values are (8.5 and 3) respectively:
   1. Determine the type of each one.
   2. What happens when you mix them together?

7 Give reasons for the following:

1. Litmus paper is not suitable for distinguishing between strong and weak acids.

2. Litmus paper doesn't affect distilled water.

3. Nitric acid turns the blue litmus paper into red.

4. Calcium hydroxide turns the red litmus paper into blue.

8 What happens in each one of the following:

1. You put a piece of sugar in a test tube containing sulphuric acid?

2. You place two red and blue litmus strips in a tube of hydrogen gas?

3. You place two red and blue litmus strips in a tube containing chlorine gas?

4. You place two red and blue litmus strips in a tube containing carbon dioxide gas?

5. You place two red and blue litmus strips in a tube containing ammonia gas?

6. You add calcium hydroxide to acidic soil?

Pony Revision on Unit 1 – Lesson 1

Metals and Nonmetals

First Week

1 Complete the following sentences:

1. The outermost energy level of metals contains **less than** four electrons, while that of nonmetals contains **more than** four electrons.
2. Element (A), with its outermost energy level (M) containing two electrons, is a **metal**, while element (B), with its outermost energy level (L) containing six electrons, is a **nonmetal**.
3. All metals are solids, except for **mercury**, which is a liquid.
4. All nonmetals are bad conductors of electricity, except for **carbon (graphite)**, which is a good conductor of electricity.
5. Some nonmetals are solid materials, such as **carbon**; gaseous materials, such as **nitrogen**; and the only liquid is **bromine**.
6. The atoms of solid metals are arranged in a structure known as **crystal lattice**.
7. The metallic bond is formed due to the attraction between the positive **ions** of a metal and the cloud of valence negative **electrons** surrounding it.
8. The bronze alloy is composed of **tin** at 5% and **copper** at 95%.
9. The bronze alloy is used in manufacturing **medals** and **jewelry**.
10. The bronze alloy is characterized by being **harder** than copper and **resistant** to rust.

2 Cross out the odd word, and then write the relation between the remaining words:

1. Gold – Silver – Bromine – Mercury (**Bromine**)
   (They are metallic elements.)
2. Phosphorus – Bromine – Mercury – Sulfur (**Mercury**)
   (They are nonmetallic elements.)
3. Graphite – Bromine – Phosphorus – Sulfur (**Graphite**)
   (They are bad electric conductors.)
4. Iodine – Sulfur – Carbon – Hydrogen (**Hydrogen**)
   (They are solid nonmetallic elements.)
5. Bronze – Chlorine – Copper – Tin (**Chlorine**)
   (It is an alloy and its components.)

3 How do you differentiate between each of the following:

1. Phosphorus and iron, in terms of:
   - a. Metallic luster
   - b. Malleable and ductile
   - c. Conductivity of heat and electricity
   - d. Melting point

P.O.C	Phosphorus	Iron
a. Metallic luster	It has no metallic luster.	It has a metallic luster.
b. Malleable and ductile	It is not malleable or ductile.	It is malleable and ductile.
c. Conductivity of heat and electricity	It is a bad conductor of heat and electricity.	It is a good conductor of heat and electricity.
d. Melting point	It has a low melting point.	It has a high melting point.

2. Sodium and graphite, in terms of:
   - a. Metallic luster
   - b. Which one is opaque

P.O.C	Sodium	Graphite
a. Metallic luster	It has a metallic luster.	It has no metallic luster.
b. Which one is opaque?	Shiny	Opaque

3. Sulfur and copper, in terms of:
   - a. Malleable and ductile
   - b. Which one is more brittle?

P.O.C	Sulfur	Copper
a. Malleable and ductile	It is not malleable or ductile.	It is malleable and ductile.
b. Which one is more brittle?	Brittle	Hard

4. Silver and phosphorus, in terms of:

Conductivity of electric current

P.O.C	Silver	Phosphorus
Conductivity of electric current	**It is a good conductor of electricity.**	**It is a bad conductor of electricity.**

4 What is meant by each one of the following:

1. Metallic bond

It is the attraction force between the positive metal ions and the cloud of negative valence electrons surrounding them.

2. Alloy

It is a mixture that is composed of two or more molten metals.

3. Recycling

It is the process of conversion of the wastes into new usable substances.

5 What is the benefit of recycling metal wastes?

Recycling metals is much cheaper and easier than extracting them from their ores.

6 If elements (A & B) have melting points of (1538 & 115.21) respectively, answer the following questions:

1. What is the type of each one of them? And why?

- A is a metal because it has a high melting point.

- B is a nonmetal because it has a low melting point.

2. Which one of them is a good conductor of electricity?

- A is a good electric conductor of electricity because it is a metal.

3. Which one of them is malleable and ductile?

- A is malleable and ductile because it is a metal.

7 **Complete the following table that shows some materials & their properties.**

You can choose the color from the following words bank:

(Black – Colorless – Yellow – Waxy white – Silver – Red)

Element	Type	Physical State	Electric Conductivity	Color
1- Oxygen	Nonmetal	Gas	Bad conductor	Colorless
2- Gold	Metal	Solid	Good conductor	Yellow
3- Carbon	Nonmetal	Solid	Good conductor	Black
4- Bromine	Nonmetal	Liquid	Bad conductor	Red
5- Nitrogen	Nonmetal	Gas	Bad conductor	Colorless
6- Mercury	Metal	Liquid	Good conductor	Silver
7- Phosphorus	Nonmetal	Solid	Bad conductor	Waxy White

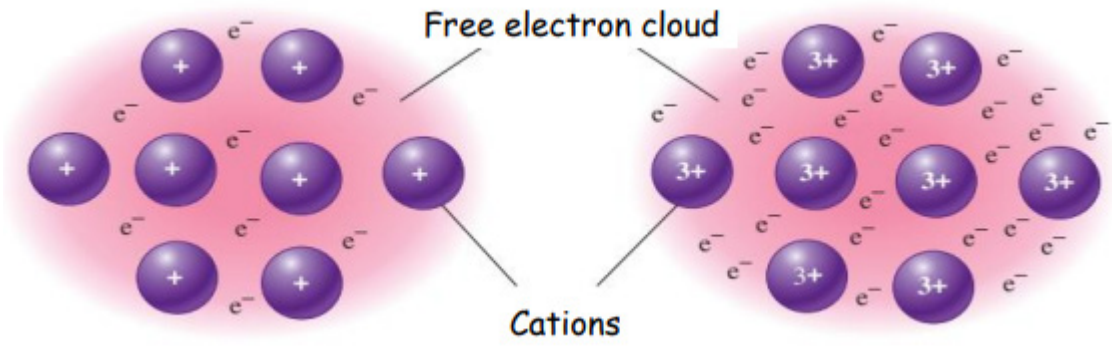
8 **Give reasons for the following:**

1. Calcium ($_{20}$Ca) is a metal, while Chlorine ($_{17}$Cl) is a nonmetal.
   - **Calcium ($_{20}$Ca) is a metal because it has 2 electrons in its outermost energy level.**
   - **Chlorine ($_{17}$Cl) is a nonmetal because it has 7 electrons in its outermost energy level.**
2. Carbon is used in the manufacture of dry cells although it is a nonmetal.
   - **Because carbon is a good conductor of electricity.**
3. Calcium ($_{20}$Ca) is harder than sodium ($_{11}$Na).
   - **Because the metallic bond in calcium is stronger than that in sodium, as calcium has two valence electrons, while sodium has one valence electron only.**
4. A bronze alloy is used in the manufacture of medals instead of copper.
   - **Because a bronze alloy is harder than copper and it doesn't rust.**

9 **What happens if we knock on a piece of graphite?**

- **The piece of graphite breaks off easily because graphite is a brittle nonmetal.**

10 **The following figure shows a bond between two different elements:**



1. What are the types of the two elements in the figure? And why?
   - **The two elements are metals.**
   - **Because they have less than four electrons in their outermost energy levels.**
2. What is the valency of each?
   - **Sodium (Na) is monovalent +1** - **Aluminum (Al) is trivalent +3**
3. What is the type of bond in both of them?
   - **Metallic bond**
4. Which is stronger in terms of the bond? And why?
   - **The metallic bond in aluminum is stronger than that in sodium.**
   - **Because the strength of the metallic bond increases by increasing the number of valence electrons.**

   (Aluminum has three valence electrons, while sodium has only one valence electron, so aluminum's metallic bond is stronger than sodium's metallic bond.)
5. What happens if we increase the number of valence electrons in the metal atoms according to the metallic bond?
   - **The strength of the metallic bond increases.**
6. What happens if we mix molten gold with molten copper?
   - **An alloy, which has different properties than gold and copper, is formed.**

Pony Revision on Unit 1 – Lesson 2

Acids and Alkalis

Second and Third Weeks

1 Complete the following sentences:

1. The scientist **Arrhenius** clarified that acids are substances that dissolve in water and produce **positive hydrogen ions**, while bases, when dissolved in water, produce **negative hydroxide ions**.
2. The molecular formula of the carbonate group is **CO_3^{-2}**, while the molecular formula of the sulphate group is **SO_4^{-2}**.
3. Oxygenated acids are those that contain **oxygen** element, such as **sulphuric acid** and **nitric acid**.
4. Non-oxygenated acids don't contain **oxygen** element, such as **hydrochloric acid** and **hydrobromic acid**.
5. The number of hydrogen atoms in an acid molecule is equal to the charge of the **anion** that forms it.
6. The number of hydroxide groups in a base molecule equals the charge of the **cation** that forms it.
7. Lactic acid provides the muscles with **energy** during a lack of oxygen, and its accumulation in the muscles causes **muscle cramps**.
8. The molecular formula of acids starts with a positive **hydrogen** cation, and their names are associated with the **anion** in their composition.
9. The molecular formula of alkalis (bases) ends with a **hydroxide group**, and their names are associated with the **cation** in their composition.
10. The molecular formula of alkalis (bases) that contain a cation Ca^{-2} is **$Ca(OH)_2$**.
11. The total charge of molecules of any compound equals **zero**.
12. The stomach secretes **hydrochloric** acid, which helps in **food digestion**.
13. Lemon and ketchup are considered **acidic** substances, while toothpaste and baking soda are considered **alkaline** substances.
14. When hydrochloric acid dissolves in water, it produces a **positive**

Hydrogen (H^+) ion and a **negative chloride (Cl^-)** ion.

15. When magnesium hydroxide dissolves in water, it forms a **positive magnesium** ion and a **negative hydroxide** ion.
16. Acids react with alkalis to form **salt** and **water**.
17. Nitric acid is considered from **strong** acids, while nitrous acid and sulfurous acid are considered from **weak** acids.
18. Metals burn in the presence of oxygen gas, forming **metal oxides**, and most of them are known as **basic** oxides.
19. Nonmetals burn in the presence of oxygen gas, forming **nonmetal oxides**, and most of them are known as **acidic** oxides.
20. The dissolution of sulphur trioxide (SO_3) in water forms **sulphuric acid H_2SO_4**.
21. Dissolving **magnesium oxide (MgO)** in water forms magnesium hydroxide.
22. The combustion of fossil fuels produces oxides of **SO_2** and **NO_2**.

2 How to differentiate between:

1. The bicarbonate group and the sulphate group, in terms of the number of charges they carry - the molecular formula.

P.O.C	Bicarbonate group	Sulphate group
a. The number of charges they carry	One negative charge	Two negative charges
b. The molecular formula	HCO_3^-	SO_4^{-2}

2. Sulphuric acid and calcium hydroxide, in terms of the molecular formula.

P.O.C	Sulphuric acid	Calcium hydroxide
The molecular formula	H_2SO_4	$Ca(OH)_2$

3. Sulphurous acid and sulphuric acid, in terms of the molecular formula.

P.O.C	Sulphurous acid	Sulphuric acid
The molecular formula	H_2SO_3	H_2SO_4

4. Acidic oxides and basic oxides,
according to the definition - the result of their dissolution in water.

P.O.C	Acidic oxides	Basic oxides
a. Definition	**They are nonmetal oxides that dissolve in water, forming acids.**	**They are metal oxides that dissolve in water, forming alkalis.**
b. The result of their dissolution in water	**Acids**	**Alkalis**

5. Sulphurous acid and sulphuric acid,
according to the molecular formula - strength and weakness.

P.O.C	Sulphurous acid	Sulphuric acid
a. The molecular formula	**H_2SO_3**	**H_2SO_4**
b. Strength and weakness	**Weak acid**	**Strong acid**

3 Give one example of each of the following:

1. A positive atomic group.
Ammonium atomic group (NH_4^+)

2. A non-oxygenated acid that forms an anion in a liquid state.
Hydrochloric acid (HCl)

3. An acid secreted by the stomach.
Hydrochloric acid (HCl)

4. An oxygenated acid that carries three negative charges.
Phosphoric acid (H_3PO_4)

5. An acid secreted by the muscles.
Lactic acid

6. A weak acid.
Nitrous acid (HNO_2)

7. A strong acid.
Hydrochloric acid (HCl)

8. A strong alkali.

Sodium hydroxide (NaOH)

9. A weak alkali.

Ammonium oxide (NH_4OH)

10. A metallic oxide.

Magnesium oxide (MgO)

11. A non-metallic oxide.

Sulphur trioxide (SO_3)

4 Write the chemical formula for the following compounds:

1. Hydrosulphuric acid (**H_2S**)
2. Hydrobromic acid (**HBr**)
3. Sulphurous acid (**H_2SO_3**)
4. Phosphoric acid (**H_3PO_4**)
5. Ammonium hydroxide (**NH_4OH**)
6. Hydrochloric acid (**HCl**)
7. Sulphuric acid (**H_2SO_4**)
8. Nitric acid (**HNO_3**)
9. Potassium hydroxide (**KOH**)
10. An atomic group consisting of three elements (**HCO_3**)
11. Nitrous acid (**HNO_2**)

5 Write the names of the following chemical compounds and state their type:

1. H_2SO_4 (**Sulphuric acid**) (**Acid**)
2. H_2CO_3 (**Carbonic acid**) (**Oxyacid**)
3. HCl (**Hydrochloric acid**) (**Acid that doesn't contain oxygen**)
4. HNO_2 (**Nitrous acid**) (**Oxyacid**)
5. MgO (**Magnesium oxide**) (**Basic oxide**)
6. SO_3 (**Sulphur trioxide**) (**Acidic oxide**)
7. $Mg(OH)_2$ (**Magnesium hydroxide**) (**Alkali**)
8. H2S (**Hydrosulphuric acid**) (**Acid that doesn't contain oxygen**)

9. H_3PO_4 (**Phosphoric acid**) (**Oxyacid**)
10. NaCl (**Sodium chloride**) (**Salt**)

6 What is meant by each of the following:

1. Atomic group

   It is an ion composed of more than one atom of more than one element.

2. Acids

   They are substances that dissolve in water and give positive hydrogen ions H^+.

3. Alkalis

   They are substances that dissolve in water and give negative hydroxide ions OH^-.

4. Acidic oxides

   They are nonmetal oxides that dissolve in water, forming acids.

5. Basic oxides

   They are metals oxides that dissolve in water, forming alkalis.

6. Acid rains

   They are rains resulting from the dissolution of acidic oxides in the water vapor of the atmosphere.

7 What is the benefit of each of the following:

1. Stomach acid

   It participates in the food digestion.

2. Lactic acid

   It provides the muscle with oxygen when oxygen is lacking.

3. Milk of magnesia

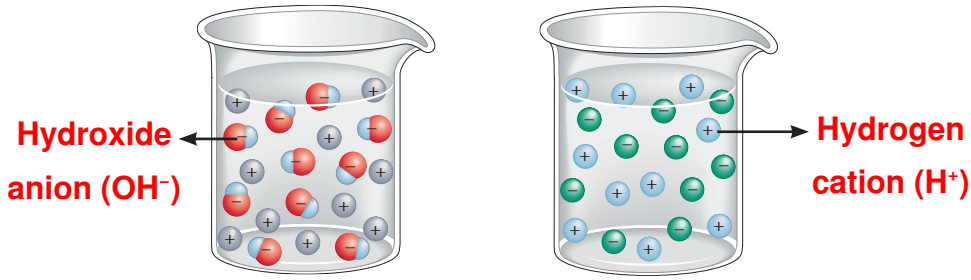
   To neutralize gastric acidity as it contains magnesium hydroxide.

4. Litmus paper

   To differentiate between acids and alkali, as acids turn the litmus paper into red, while alkalis turn the litmus paper into blue.

8 Study the following figures, and then answer the questions below:

The two figures show two compounds, one alkaline and the other acidic.



1. Which is acidic and which is alkaline?

   Compound (1) is acidic, while compound (2) is alkaline.

2. Which of them results from the dissolution of a nonmetal and which results from the dissolution of a metal?

   1. An acidic compound results from the dissolution of a nonmetal.

   2. An alkaline compound results from the dissolution of a metal.

3. What is the result of adding the first tube to the second tube?

   Salt and water

4. How do you differentiate between them with a litmus strip?

   Compound (1) turns the blue litmus strip into red.

   Compound (2) turns the red litmus strip into blue.

9 Study the following figures, and then answer the questions below:

The two opposite figures show two alkali compounds, which are sodium hydroxide and ammonium hydroxide.

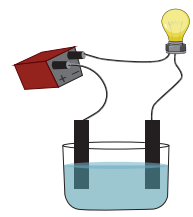


Figure 1

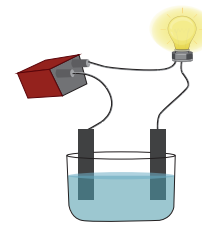


Figure 2

1. Write the chemical formula for each of them.

   Sodium hydroxide → NaOH

   Ammonium hydroxide → NH_4OH

2. Which one of them is weakly alkaline? And why?

   Figure 1 (ammonium hydroxide) because a weak alkali doesn't conduct electricity well, so the light bulb give weak light.

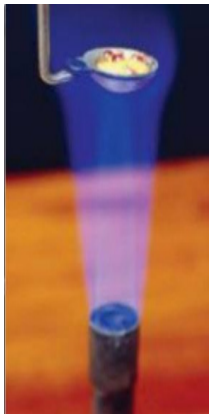
3. Which one of the two figures represents (NaOH)?

   Figure (2)

10 Study the following figures, and then answer the questions below:

The two figures show the combustion of two elements:

Combustion of a magnesium ribbon



Combustion of sulphur crystals

1. Which is a metal and which is a nonmetal?

   Magnesium is a metal, while sulphur is a nonmetal

2. What is the result of combustion of each of them?

   - The combustion of magnesium produces magnesium oxide (MgO).

   - The combustion of sulphur produces sulphur trioxid (SO_3).

3. How do we differentiate between them through practical experience?

   - When magnesium oxide dissolves in water, it forms an alkali, which turns the red litmus strip into blue.

   - When sulphur trioxide dissolves in water, it forms an acid, which turns the blue litmus strip into red.

11 Give reasons for the following:

1. Acids turn the blue litmus paper into red.

   - Because acids dissolve in water, giving a hydrogen cation H^+.

2. Alkalis turn the red litmus paper into blue.

   - Because alkalis dissolve in water, giving a hydroxide anion OH^-.

3. Milk of magnesia is used to treat stomach acidity.

   - To neutralize the gastric acidity, as it contains $Mg(OH)_2$.

12 What happens when:

1. An electric current passes through sulphuric acid and acetic acid, according to the lighting of the lamp?

   Sulphuric acid is a strong acid, so the light of the lamp will be strong, while acetic acid is a weak acid, so the light of the lamp will be weak.

2. Acids are mixed with alkalis?

   Salt and water are formed.

3. You heat a piece of magnesium, and then add water to the product?

   Magnesium oxide (MgO) is formed, which dissolves in water giving magnesium hydroxide $Mg(OH)_2$.

4. You heat a piece of sulphur?

   Sulphur trioxide (SO_3) is formed.

5. You add water to the previous product?

   Sulphuric acid (H_2SO_4) is formed.

6. You put a blue litmus paper in the solution?

   The litmus paper will turn into red.

7. Sulphur oxide is dissolved in rain water?

   Acid rain is formed.

13 Mention the damages caused by acid rains.

1. Destruction of forests. **2. Harming aquatic organisms.**

3. Harming the respiratory system. **4. Corrosion of buildings.**

Pony Revision on Unit 1 – Lesson 3

Chemical Indicators and Salts

Fourth Week

1 Complete the following sentences:

1. **Chemical indicators** are chemical substances that change their color in an acidic medium compared to a basic medium, such as **litmus indicator**.
2. Distilled water has a neutral effect and does not change the color of the litmus strip due to the equal number of **H^+** ions with **OH^-** ions.
3. There are many indicators, such as litmus strip and **universal indicator**.
4. We reduce soil acidity by adding **basic** materials, such as **calcium hydroxide $Ca(OH)_2$**.
5. The pH value of acids is **less** than 7, while the pH value of **bases** is greater than 7.
6. The pH value of a table salt solution (sodium chloride) is **seven**.
7. The pH value is accurately measured by using a device called **pH meter**.
8. Acidic gases include **carbon dioxide (CO_2)** and **nitrogen dioxide (NO_2)**.
9. Basic gases include **ammonia gas (NH_3)**.
10. Neutral gases, which do not affect a litmus strip, include **hydrogen gas (H_2)** and **oxygen gas (O_2)**.

2 Cross out the odd word, and then write the relation between the remaining words:

1. Universal indicator strips – Litmus paper – Voltmeter – pH meter (**Voltmeter**)

   (The others are chemical indicators.)
2. N_2 – H_2O – H_2 – HCl (**HCl**)

   (The others have neutral effect on the litmus strip.)
3. SO_2 – Cl_2 – CO_2 – NH_3 (**NH_3**)

   (The others are acidic gases.)
4. HNO_3 – H_2SO_4 – H_2O – HCl (**HCl**)

   (The others are acids.)

3 How do you differentiate between each of the following:

1. Distilled water and hydrochloric acid in two ways

P.O.C	Distilled water	Hydrochloric acid
a. By litmus indicator	It doesn't change the color of the litmus strip.	It turns the color of the blue litmus strip into red.
b. By pH meter	The pH value equals seven.	The pH value is less than seven.

2. CO_2 and O_2 gases

P.O.C	CO_2	O_2
a. By a wet litmus strip	It turns the color of the blue litmus strip into red.	It doesn't change the color of the litmus strip.

3. Ammonia gas and nitrogen dioxide gas

P.O.C	Ammonia gas	Nitrogen dioxide
a. By a wet litmus strip	It turns the color of the red litmus strip into blue.	It turns the color of the blue litmus strip into red.

4 Give one example of each of the following:

1. A gas that turns the blue litmus strip into red. **Carbon dioxide gas**

2. A gas that turns the red litmus strip into blue. **Ammonia gas**

3. A gas that has a neutral effect on the litmus paper. **Hydrogen gas**

4. A chemical indicator that measures the pH accurately. **pH meter**

5 What is meant by each one of the following:

1. Indicators

They are chemical substances whose color differ in the acidic medium from the alkaline medium.

2. Universal indicator

It is a chemical indicator that can be used to distinguish between acids and alkalis, acids and each other, or alkalis and each other according to their strength.

3. pH value

It is a scale ranging from 0 to 14 that indicates the acidity of basicity of a solution.

6 Answer the following questions:

1. If you have nitric acid and nitrous acid:

(1) Write their molecular formula.

Nitric acid → HNO_3 **Nitrous acid → HNO_2**

(2) Which one is strong and which one is weak?

Nitric acid is a strong acid, while nitrous acid is a weak acid.

(3) How do you differentiate between them?

By measuring the pH value of them using a pH meter device, the pH value of nitrous acid is less than that of nitric acid.

2. If you have two compounds (A) & (B) and their pH values are (8.5 and 3) respectively:

(1) Determine the type of each one.

Compound (A), with pH value 8.5, is a base (alkali), while compound (B), with pH value 3, is an acid.

(2) What happens when you mix them together?

They will produce salt and water.

7 Give reasons for the following:

1. Litmus paper is not suitable for distinguishing between strong and weak acids.

Because the litmus strip gives the same color with both of them.

2. Litmus paper doesn't affect distilled water.

Because distilled water is a neutral solution, as the number of cations of H^+ equals the number of anions of OH^-.

3. Nitric acid turns the blue litmus paper into red.

Due to the presence of hydrogen cations (H^+).

4. Calcium hydroxide turns the red litmus paper into blue.

Due to the presence of hydroxide anions (OH^-).

8 What happens in each one of the following:

1. You put a piece of sugar in a test tube containing sulphuric acid?

The sugar becomes black (charred).

2. You place two red and blue litmus strips in a tube of hydrogen gas?

The colors of the two wet litmus strips don't change.

3. You place two red and blue litmus strips in a tube containing chlorine gas?

The color of the two wet litmus strips is removed.

4. You place two red and blue litmus strips in a tube containing carbon dioxide gas?

- The color of the blue wet litmus changes into red.

- The color of the red wet litmus does not change.

5. You place two red and blue litmus strips in a tube containing ammonia gas?

- The color of the blue wet litmus does not change.

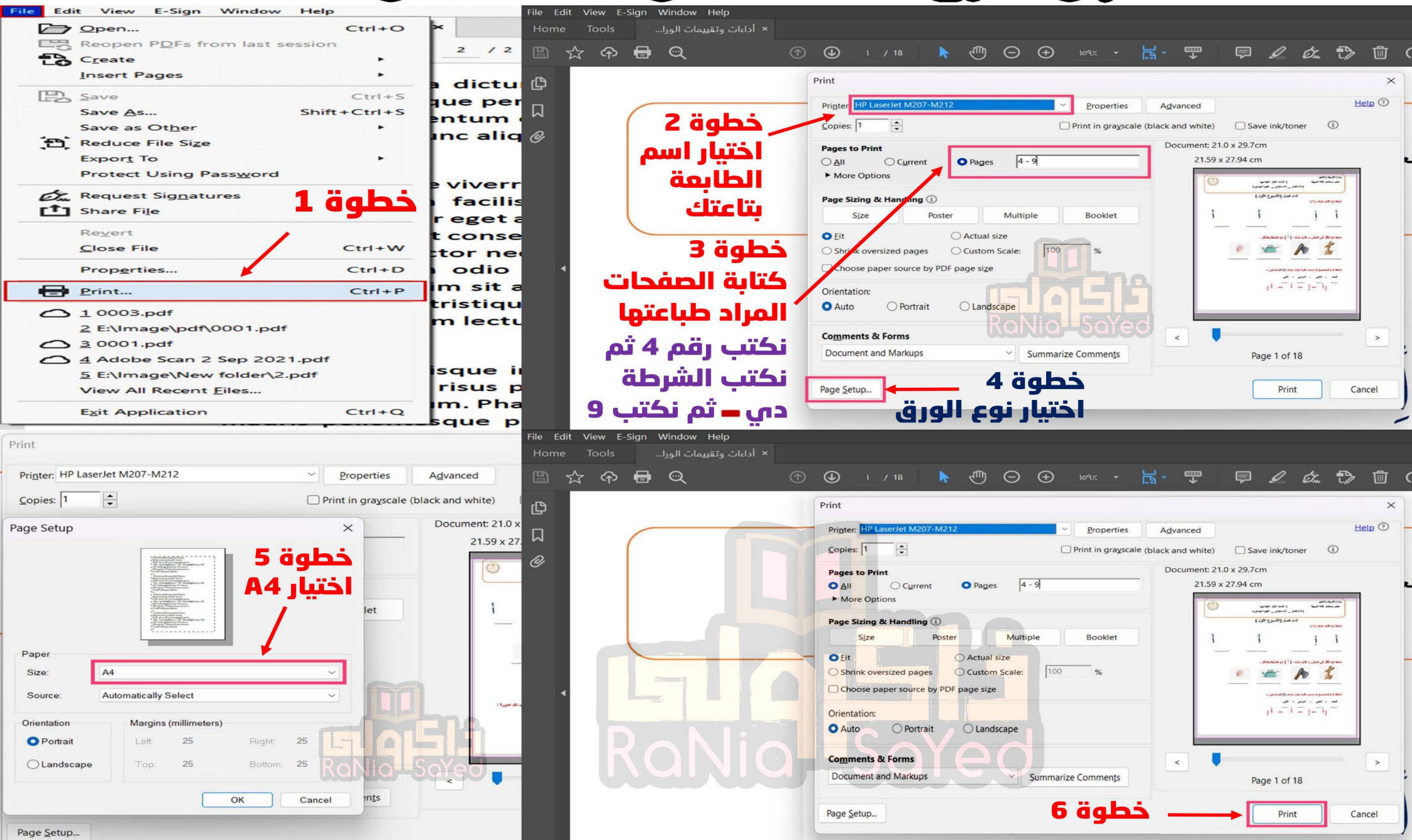
- The color of the red wet litmus changes into blue.

6. You add calcium hydroxide to acidic soil?

Calcium hydroxide is an alkaline substance, so it will treat and reduce the soil acidity.

كيفية طباعة صفحات معينة من ملف معين

مثلا ازاى نطبع الصفحات من صفحة 4 الى صفحة 9



المراجعة رقم (2)

اختبار شهر فبراير

Question 01 Write scientific term

1)Mixture composed of the melts of two or more metals

(.....)

2) A mixture composed of the melts of two or more metals.

(.....)

3) The process of the conversion of the wastes into new usable substances. (.....)

4) An ion composed of more than one atom of more than one element. (.....)

5) A substance whose dissolution in water increases the percentage of hydrogen cations (H+) in the solution.

(.....)

6)substance whose dissolution in water increases the percentage of hydroxide anionsOH) in the solution.

(.....)

7)Metal oxides, some of which dissolve in water forming alkalis.

(.....)

8)Nonmetal oxides that dissolve in water forming acids.

(.....)

9)Rain resulting from the dissolution of acidic oxides in atmospheric water vapor.

(.....)

10)Chemical substances whose color differs in acidic medium from that in alkaline medium.

(.....)

11)An indicator that can differentiate between acids and alkalis or between different acids or different alkalis, based on their strength.

(.....)

12)A scale ranging between the values 0 to 14, used to determine the acidity and the basicity of solutions.

(.....)

13)Used in the manufacture of the dry cell.

(.....)

14)Alloy composed of copper (95%) and tin (5%). (.....)

15)Used in the manufacture of jewelry, statues, and medals.

(.....)

16)Secreted by the stomach and participates in food digestion.

(.....)

17)Secreted by the body and provides muscles with the necessary energy during their lack of oxygen during muscular effort.

(.....)

18)A basic substance that treats the acidic soil. (.....)

19)Used as a temporary treatment to neutralize gastric acidity.

(.....)

20)Differentiate between acidic, alkaline, and neutral substances.

(.....)

21)Determination of pH values for any solutions directly and accurately. (.....)

22)the only liquid metal (.....)

23) the only liquid non metal (.....)

Question 02 Write molecular formula of

1. Silver nitrate
2. Nickel carbonate
3. Ammonium sulphate
4. Magnesium chloride
5. Copper phosphate
6. Sodium carbonate
7. Calcium chloride
8. Zinc nitrate
9. Hydrogen fluoride
10. Ammonium chloride

11. Silver carbonate
12. Nickel phosphate
13. Copper carbonate
14. Sodium nitrate
15. Magnesium phosphate
16. Calcium sulphate
17. Zinc chloride
18. Sulfurous acid
19. Sodium phosphate
20. Hydrogen chloride
21. Copper chloride
22. Ammonium carbonate
23. Nickel chloride
24. Calcium nitrate
25. Zinc phosphate
26. Magnesium sulphate
27. Ammonium phosphate
28. Silver phosphate
29. Hydrogen bromide
30. Sodium hydroxide
31. Calcium phosphate

32. Zinc sulphate
33. Magnesium hydroxide
34. Nitrous acid
35. Nickel nitrate
36. Hydrogen sulphide
37. Silver chloride
38. Magnesium carbonate
39. Copper nitrate
40. Ammonium nitrate
41. Copper sulphate
42. Lithium hydroxide
43. Nickel sulphate
44. Silver sulphate
45. Magnesium nitrate
46. Sodium sulphate
47. Hydrochloric acid
48. Nitric acid
49. Phosphoric acid
50. Sulphuric acid

Question 03 Give reason for

1.The color of Hydrangea flowers varies according to the type of soil.

2.It is not possible to differentiate between hydrochloric acid and acetic acid by using litmus strip.

3. Recycling some metals.

4. Sodium hydroxide solution can be differentiated from ammonium hydroxide solution by using the electrical conductivity.

5. Aluminum (13Al) is harder and has a higher melting point than sodium (Na).

6. Acid rains have severe harmful impacts on humans and the environment in general.

7. Most salts are ionic compounds.

8. The neutral solution (distilled water) does not affect the color of both red and blue litmus strips.

9. The total charge of the molecule of any compound equals zero.

10. The acidity of grapes is stronger than that of tomatoes.

11. Some electrical wires are made of aluminum.

12. The dangers of burning fossil fuels in cars, factories, and power stations.

13. It is forbidden to taste, smell or touch any chemical substance in the laboratory without the teacher's permission.

14. It is not possible to drown in the Dead Sea.

15. It is possible to differentiate between acids and alkalis by using litmus strips.

16. Graphite is used in the manufacture of dry cells despite being a nonmetal.

17. Milk of magnesia is used as a temporary treatment for gastric acidity.

18. A piece of sulphur can be easily crumbled when hammered, while iron sheets are formed when hammered.

19. pH meter device is more accurate than universal indicator strips in determining the pH value of a solution.

20. The bronze alloy is used in jewellery and statues instead of copper metal.

21. The difference in the number of hydrogen atoms in acid molecules.

22. Aluminum ion Al^{3+} combines with one phosphate group to form an aluminum phosphate molecule, while it combines with three nitrate groups to form an aluminum nitrate molecule.

Question 04 What happen if

1.Burning of sulphur in the presence of oxygen followed by the dissolution of the product in water.

2.Two strips of blue litmus are dipped in both acetic acid and distilled water separately.

3. The number of valence electrons in metal atoms increases regarding the strength of the metallic bond.

4. Stirring an amount of nickel chloride and silver chloride salts separately in an amount of water.

5. Acids react with alkalis.

6. Bringing red and blue litmus strips wetted with water close to ammonia gas evolved from a tube.

7. Adding molten metal to another molten metal.

8. Burning of magnesium in the presence of oxygen followed by the dissolution of the product in water.

9. Two strips of litmus, one is blue and the other is red, are placed in a solution with pH value of 11.

10. The accumulation of lactic acid in the muscles of the human body.

11.we hammering on apiece of sulfur

12.we conduct aluminum and phosphorus according to electric conductors

13. We add sugar to sulfuric acid

14.we plant hydrangea flower in acidic soil and in basic soil

15.we connect distilled water To electricity according to conduction

Question 05 Choose the correct answer

1. Which of the following is the correct arrangement of the hardness of sodium (Na), magnesium (Mg), and aluminum (Al)?

a) Na > Mg > Al.
b) Mg > Na > Al
c) Al > Mg > Na.
d) Al > Na > Mg

2. The bronze alloy is formed by adding a small percentage of metal (X) to metal (Y). Which of the following identifies the metals (X) and (Y)?

a) (X): Copper, (Y): Tin.
b) (X): Copper, (Y):
c) Lithium(x)
d) Chlorine (y)

4. Which of the following oxides, when dissolved in atmospheric water vapor, produces acid rain?

a) SO_2.
b) CaO.
c) Na_2O.
d) MgO

5. What is the molecular formula of the acid secreted by the stomach and participates in food digestion?

a) HBr.
b) HCl.
c) H_2SO_4.
d) HNO_3

6. The ion present in lemon juice that causes the color change in the litmus strip is:

a) NH_4^+.
b) OH^-.
c) H^+.
d) NO_3^-

7. Which of the following properties is NOT a characteristic of graphite?

a) It is brittle.
b) It is a bad electrical conductor.
c) It is black in color.
d) It does not have metallic luster.

8. What is the common property of both sodium and copper?

a) Color.
b) Density.
c) Melting point.
d) Physical state

9. The compound HBr in its gaseous state is known as:

a) Hydrogen bromide.
b) Hydrobromic acid
c) Bromide hydride.
d) Hydrobromide acid

10. Which of the following substances are acids?

a) Lemon and baking soda.
b) Soap and toothpaste
c) Ketchup and grapes.
d) Detergents and ketchup

11. When hydrochloric acid (HCl) reacts with sodium hydroxide (NaOH), the formed salt is:

a) NaCl.
b) Na_2O.
c) H_2O.
d) $NaCl_2$

12. What is the similarity between metals and nonmetals?

a) They do not have metallic luster.
b) They are good conductors of heat.
c) They are malleable, ductile, and formable.
d) The last energy level in their atoms is not filled with electrons.

13. On dissolving calcium oxide in water and placing two litmus strips in the solution, the color of one of them changes into:

a) Red.
b) Purple.
c) Blue.
d) Yellow

14. The alkaline solution which is poured into clogged drains to clear them is likely to be:

a) HCl. b) H_2O. c) NaOH. d) H_2SO_4

15. Which of the following questions helps classify elements as metals or nonmetals?

a) Is it solid? b) Is it colored? c) Is it liquid? d) Is it brittle?

16. Which of the following atomic groups carries the same charge as the hydroxide group?

a) Ammonium. b) Nitrate. c) Sulphate. d) Phosphate

17. If the hardness of sodium (Na) on the hardness scale is 0.5, then the hardness of aluminum (Al) is:

a) 0.1. b) 0.25. c) 0.5. d) 2.75

18. Each of the following expresses the compound H_2S, except:

a) It is known as hydrogen sulfide in its gaseous state.

b) It is known as hydrofluoric acid in its solution form.

c) Its cation carries two positive charges.

d) Its anion carries two negative charges.

19. The correct name of H_2SO_3 acid is:

a) Sulfuric acid. b) Hypochloric acid

c) Sulfurous acid. d) Hypochlorous acid

20. All the following are harmful impacts of acid rain, except:

a) Destruction of forests. b) Corrosion of buildings.

c) Destruction of the human digestive system. d) Death of aquatic organisms.

21. Which of the following is a property of sodium hydroxide?

a) It dissolves in water, producing H^+ ions.

b) Its aqueous solution turns blue litmus strip to red.

c) Its solution reacts with hydrochloric acid forming salt and water.

d) Its solution reacts with lithium hydroxide solution forming salt and water.

22. The red litmus strip turns blue when placed in each of the following, except:

a) Oven cleaner. b) Ketchup. c) Toothpaste. d) Baking soda solution.

23. What is the substance that dissolves in water and turns it into an alkaline solution?

a) MgO. b) NO_2. c) SO_3. d) CO_2

24. Which of the following elements is a liquid with metallic luster?

a) Mercury. b) Bromine. c) Lithium. d) Chlorine

25. The ion whose percentage in the solution increases when an acidic oxide dissolves in water is:

a) H^+. b) OH^-. c) Na^+. d) Cl^-

26. If the anion which composes the acid HClO is called hypochlorite, then the acid is called:

a) Hypochlorous acid. **b) Perchloric acid.**

c) Hypochloric acid. **d) Chlorous acid.**

27. Which of the following is NOT a property of solid sodium hydroxide?

a) It dissolves in water and reacts with HCl acid.

b) It dissolves in water and does not react with HCl acid.

c) It does not dissolve in water and does not react with HCl acid.

d) It does not dissolve in water and reacts with HCl acid.

28. The molecular formula of hydrochloric acid is:

a) HCl. **b) HClO.** **c) $HClO_2$.** **d) $HClO_3$**

29. Which of the following is the correct formula for an oxyacid?

a) H_2O_3S. **b) H_2S.** **c) H_2SO_3.** **d) H_2O_2**

30. Each of the following acids is strong, except:

a) Nitric acid. **b) Acetic acid.** **c) Sulfuric acid.** **d) Hydrochloric acid.**

31. Each of the following is a weak electrical conductor, except:

a) Ammonium hydroxide. **b) Sodium hydroxide.**

c) Sulfurous acid. **d) Nitrous acid.**

32. The compound used in antacids is:

a) $MgCl_2$. **b) $Mg(OH)_2$.** **c) NaCl.** **d) H_2SO_4**

33. Among the basic oxides is:

a) SO_2. **b) SO_3.** **c) H_2CO_3.** **d) Na_2O**

34. All the following are properties of alkalis, except:

a) They contain OH^- ions.

b) They turn red litmus strip to blue.

c) They can react with sodium hydroxide solution.

d) They can react with hydrochloric acid solution.

35. The structures of all the negative atomic groups you have studied include:

a) Hydrogen element. **b) Nitrogen element.**

c) Oxygen element. **d) Sulfur element.**

36. Carbonate and sulfate groups are similar in:

a) Charge and number of elements only.

b) Charge and number of atoms only.

c) Number of elements and number of atoms only.

d) Charge, number of elements, and number of atoms.

37. All the following are oxides produced from burning fossil fuels, except:

a) SO_3. **b) Na_2O.** **c) NO_2.** **d) SO_2**

38. When the pH value of a solution changes from 8 to 5, that means it was:

a) Acidic and becomes alkaline. **b) Alkaline and becomes neutral.**

c) Acidic and becomes neutral. **d) Alkaline and becomes acidic.**

39. Which of the following expresses the solution of HI acid, except:

a) Gas dissolved in water.
b) It reacts with HCl acid.
c) It contains H^+ ions.
d) It turns blue litmus strip to red.

40. A red litmus strip is placed in solution (1), and no change in color occurs. When placed in solution (2), it turns blue. Which of the following is correct?

a) Solution (1): Neutral, Solution (2): Acidic.
b) Solution (1): Acidic, Solution (2): Neutral.
c) Solution (1): Acidic, Solution (2): Alkaline.
d) Solution (1): Alkaline, Solution (2): Acidic..

41. The acid secreted by the stomach that participates in food digestion has the molecular formula:

a) HBr. b) HCl. c) H_2SO_4. d) H_3PO_4

42. Each of the following is a molecular formula of an alkali, except:

a) NaOH. b) $Mg(OH)_2$. c) H_2S. d) NH_4OH

43. The ion present in lemon juice that causes a color change in litmus strip is:

a) NH_4^+. b) H^+. c) OH^-. d) NO_3^-

44. The compound HBr in its gaseous state is known as:

a) Hydrogen bromide.
b) Hydrobromic acid.
c) Bromide hydride.
d) Iodine.

45. Which of the following acids is NOT correctly named?

a) HNO_3 – Nitric acid.
b) HI – Hydroiodic acid.
c) H_2CO_3 – Carbonic acid.
d) H_3PO_4 – Sulfuric acid.

46. When hydrochloric acid (HCl) reacts with sodium hydroxide (NaOH), the formed salt is:

a) $NaCl_2$.
b) H_2O.
c) Na_2O.
d) NaCl

47. Which of the following oxides, when dissolved in atmospheric water vapor, produces acid rain?

a) SO_2.
b) CaO.
c) Na_2O.
d) MgO

48. All the following are harmful impacts of acid rain, except:

a) Destruction of forests.
b) Corrosion of buildings.
c) Destruction of the human digestive system.
d) Death of aquatic organisms.

49. The alkaline solution used to clear clogged drains is most likely:

a) HCl.
b) H_2O.
c) NaOH.
d) NH_4OH

50. Which of the following is NOT an acid?

a) Lemon juice.
b) Baking soda.
c) Ketchup.
d) Vinger

Question 06 Compare between

1)Distilled water and sulphuric acid in term of hydrogen and in term of conduct electricity

2)sodium and sulfur in term of (conduct electricity ,malleability , conduct electricity)

3) copper sulphate and nickel chloride according to color

4) sulphurous acid and sulphuric acid in terms of

Molecular formula - Effect on litmus strip - Electrical conductivity

5) oxygen nonmetal and aluminum metal "In terms of: Physical state - Electrical conductivity".

Question 06 Who was the scientist

1-Developed pH scale to differentiate between acidic, basic and neutral solutions.

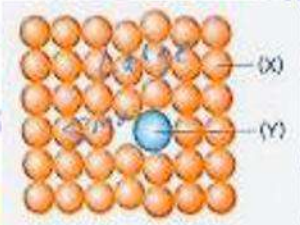
2- Clarified that acids are substances that dissolve in water and yield positive hydrogen ions H+, while alkalis are substances that dissolve in water and yield negative hydroxide ions OH

Question 08 Answer the question

1) The opposite figure represents the composition of bronze alloy:

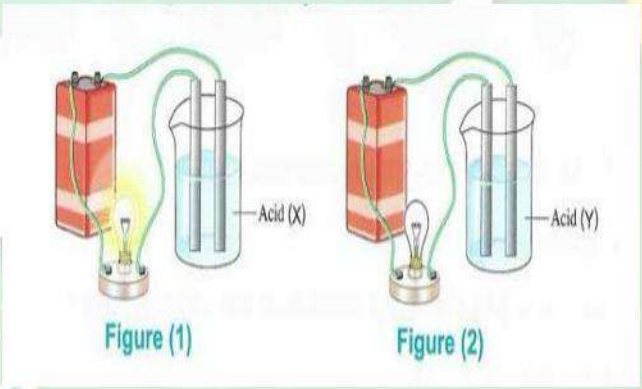
(1) What are the two elements (X) and (Y)

(2) Why are alloys preferred to use instead of pure metals?



2) The following two figures represent the electrical conductivity of hydrochloric acid and acetic acid at the same concentration

Identify the acid in each figure, with explanation.



Question 09 Complete

1)strong acid are .....electric conductor but weak acid are .....electric conductor .

2) alkali turn .....litmus strips into .....color.

3) the color of nickel chloride is ..... But copper sulphate is .....color

3) the bronze alloy consist if .....by 98% and .....by 2%

4) the silver chloride salt is .....in water

5)Oven cleaner from .....substances, while bananas from .....substances.

6) The only liquid metal is ……while the only liquid nonmetal is…….

7)……,,. a good electrical conductor nonmetal and is used in the manufacture of…….

8)muscle cramps occur due to accumulation of ……acid

9)……salts is soluble in water

10)the molecular formula of sulphuric acid is……

11)…….gas remove color of litmus strips

12) the example of basic gas is……. but acidic gas is…….

13)the dead sea has density …….times more than red sea

14)the hydrangea flower accept…….color when grow in acidic soil

Question 01 Write scientific term

1)Mixture composed of the melts of two or more metals **Alloy**

2) A mixture composed of the melts of two or more metals.**alloy**

3)The process of the conversion of the wastes into new usable substances.**recycling**

4) An ion composed of more than one atom of more than one element. **Atomic group**

5) A substance whose dissolution in water increases the percentage of hydrogen cations (H+) in the solution.**acid**

6)substance whose dissolution in water increases the percentage of hydroxide anionsOH) in the solution.**alkali**

7)Metal oxides, some of which dissolve in water forming alkalis.**basic oxides**

8)Nonmetal oxides that dissolve in water forming acids.**acidic oxides**

9)Rain resulting from the dissolution of acidic oxides in atmospheric water vapor.**acid rain**

10)Chemical substances whose color differs in acidic medium from that in alkaline medium.**indicators**

11)An indicator that can differentiate between acids and alkalis or between different acids or different alkalis, based on their strength.

Universal indicator

12)A scale ranging between the values 0 to 14, used to determine the acidity and the basicity of solutions. **Potential of hydrogen (pH**

13)Used in the manufacture of the dry cell.**graphite**

14)Alloy composed of copper (95%) and tin (5%).bronze alloy

15)Used in the manufacture of jewelry, statues, and medals.

Bronze alloy

16)Secreted by the stomach and participates in food digestion.

Hydrochloric acid

17)Secreted by the body and provides muscles with the necessary energy during their lack of oxygen during muscular effort.

Lactic acid

18)A basic substance that treats the acidic soil. Calcium hydroxide Ca(OH)2

19)Used as a temporary treatment to neutralize gastric acidity.

Milk of magnesia Mg(OH)2

20)Differentiate between acidic, alkaline, and neutral substances.

Indicators

21)Determination of pH values for any solutions directly and accurately. pH meter device

22)the only liquid metal Mercury

23) the only liquid non metal Bromine

Question 02 Write molecular formula of

1. Silver nitrate – $AgNO_3$
2. Nickel carbonate – $NiCO_3$
3. Ammonium sulfate – $(NH_4)_2SO_4$

4. Magnesium chloride – $MgCl_2$

5. Copper phosphate – $Cu_3(PO_4)_2$

6. Sodium carbonate – Na_2CO_3

7. Calcium chloride – $CaCl_2$

8. Zinc nitrate – $Zn(NO_3)_2$

9. Hydrogen fluoride – HF

10. Ammonium chloride – NH_4Cl

11. Silver carbonate – Ag_2CO_3

12. Nickel phosphate – $Ni_3(PO_4)_2$

13. Copper carbonate – $CuCO_3$

14. Sodium nitrate – $NaNO_3$

15. Magnesium phosphate – $Mg_3(PO_4)_2$

16. Calcium sulfate – $CaSO_4$

17. Zinc chloride – $ZnCl_2$

18. Sulfurous acid – H_2SO_3

19. Sodium phosphate – Na_3PO_4

20. Hydrogen chloride – HCl

21. Copper chloride – $CuCl_2$

22. Ammonium carbonate – $(NH_4)_2CO_3$

23. Nickel chloride – $NiCl_2$

24. Calcium nitrate – $Ca(NO_3)_2$

25. Zinc phosphate – $Zn_3(PO_4)_2$

26. Magnesium sulfate – $MgSO_4$

27. Ammonium phosphate – $(NH_4)_3PO_4$

28. Silver phosphate – Ag_3PO_4

29. Hydrogen bromide – HBr

30. Sodium hydroxide – $NaOH$

31. Calcium phosphate – $Ca_3(PO_4)_2$

32. Zinc sulfate – $ZnSO_4$

33. Magnesium hydroxide – $Mg(OH)_2$

34. Nitrous acid – HNO_2

35. Nickel nitrate – $Ni(NO_3)_2$

36. Hydrogen sulfide – H_2S

37. Silver chloride – $AgCl$

38. Magnesium carbonate – $MgCO_3$

39. Copper nitrate – $Cu(NO_3)_2$

40. Ammonium nitrate – NH_4NO_3

41. Copper sulfate – $CuSO_4$

42. Lithium hydroxide – $LiOH$

43. Nickel sulfate – $NiSO_4$

44. Silver sulfate – Ag_2SO_4

45. Magnesium nitrate – $Mg(NO_3)_2$

46. Sodium sulfate – Na_2SO_4

47. Hydrochloric acid – HCl

48. Nitric acid – HNO_3

49. Phosphoric acid – H_3PO_4

50. Sulfuric acid – H_2SO4

Question 03 Give reason for

1.The color of Hydrangea flowers varies according to the type of soil.

As the flowers turn red when planted in acidic soil, while they turn blue when planted in basic soil.

2.It is not possible to differentiate between hydrochloric acid and acetic acid by using litmus strip.

Because it gives the same color with both of them.(red)

3. Recycling some metals.

- The decreasing of their abundance in the Earth's crust.
- The difficulty of extracting them from their ores.
- The lower cost of recycling them compared to extracting them from their ores.

4. Sodium hydroxide solution can be differentiated from ammonium hydroxide solution by using the electrical conductivity.

Because sodium hydroxide solution is a good electrical conductor, while ammonium hydroxide solution is a bad electrical conductor.

5. Aluminum (13Al) is harder and has a higher melting point than sodium (Na).

Because the number of valence electrons in aluminum atom 3 is greater than that in sodium atom 1, and as the number of valence electrons in metal atom increases, the strength of the metallic bond increases.

6. Acid rains have severe harmful impacts on humans and the environment in general.

As it causes the destruction of forests, harms the aquatic organisms, corrosion of buildings, and health problems in human respiratory system

7. Most salts are ionic compounds.

Because they are produced from the reaction of acids with alkalis, which the alkali cation combines with the acid anion forming an ionic compound.

8. The neutral solution (distilled water) does not affect the color of both red and blue litmus strips.

As the number of H^+ cations equals the number of OH anions in the solution (distilled water)

9. The total charge of the molecule of any compound equals zero.

Because the number of positive charges in the compound equals the number of negative charges within it.

10. The acidity of grapes is stronger than that of tomatoes.

As pH value of grapes is lower than pH value of tomatoes.

11. Some electrical wires are made of aluminum.

Because aluminum is a metal and is malleable, ductile and formable, and it is a good conductor of electricity.

12. The dangers of burning fossil fuels in cars, factories, and power stations.

Because it causes the evolution of acidic oxides such as SO, and NO2, which dissolve in atmospheric water vapour, forming acid rain that has severe harmful impacts on human and the environment

13. It is forbidden to taste, smell or touch any chemical substance in the laboratory without the teacher's permission.

Because some acids are burning and some alkalis are caustic.

14. It is not possible to drown in the Dead Sea.

Because the high percentage of the salts in water leads to increasing its density

15. It is possible to differentiate between acids and alkalis by using litmus strips.

Because acids turn blue litmus strip to red, while alkalis turn red litmus strip to blue.

16. Graphite is used in the manufacture of dry cells despite being a nonmetal.

Because graphite is the only good electrical conductor nonmetal

17. Milk of magnesia is used as a temporary treatment for gastric acidity.

To neutralize gastric acidity as it contains magnesium hydroxide $Mg(OH)_2$

18. A piece of sulphur can be easily crumbled when hammered, while iron sheets are formed when hammered.

Because sulphur is a brittle nonmetal, while iron is a malleable metal.

19. pH meter device is more accurate than universal indicator strips in determining the pH value of a solution.

Because pH meter device determines the pH value of any solution directly and accurately as indicated by the number displayed immediately on its digital screen, while universal indicator strips provide an approximate pH value.

20. The bronze alloy is used in jewelry and statues instead of copper metal.

Because it is harder than copper and resistant to rust.

21. The difference in the number of hydrogen atoms in acid molecules.

Because the number of hydrogen atoms in an acid molecule equals the magnitude of the charge of the anion (or the atomic group) that composes it.

22. Aluminum ion Al^{3+} combines with one phosphate group to form an aluminum phosphate molecule, while it combines with three nitrate groups to form an aluminum nitrate molecule.

Because the total charge of any salt equals zero, and the phosphate group carries three negative charges, while the nitrate group carries one negative charge.

Question 04 What happen if

1.Burning of sulphur in the presence of oxygen followed by the dissolution of the product in water.

Sulphur trioxide (SO_3) is formed, which dissolves in water to produce sulphuric acid solution (H_2SO_4).

2.Two strips of blue litmus are dipped in both acetic acid and distilled water separately.

In acetic acid, the blue strip changes to red, whereas in distilled water, the color of the strip does not change.

3. The number of valence electrons in metal atoms increases regarding the strength of the metallic bond.

The strength of metallic bond increases, and thus the metal becomes harder and has a higher melting point.

4. Stirring an amount of nickel chloride and silver chloride salts separately in an amount of water.

Nickel chloride salt dissolves in water, while silver chloride salt does not dissolve in it.

5. Acids react with alkalis.

A salt and water are formed

6. Bringing red and blue litmus strips wetted with water close to ammonia gas evolved from a tube.

The color of the red litmus strip turns to blue

7. Adding molten metal to another molten metal.

An alloy is formed whose properties differ from those of both metals

8. Burning of magnesium in the presence of oxygen followed by the dissolution of the product in water.

Magnesium oxide (MgO) is formed, which dissolves in water to produce magnesium hydroxide solution (Mg(OH)2).

9. Two strips of litmus, one is blue and the other is red, are placed in a solution with pH value of 11.

The red litmus strep turn into blue

Blue not change

10. The accumulation of lactic acid in the muscles of the human body.

Muscle cramps

11.we hammering on apiece of sulfur

It will be cracked

12.we conduct aluminum and phosphorus according to electric conductors

Aluminum is good electric conductor but phosphorus is bad electric conductor

13. We add sugar to sulfuric acid

It will be burnt

14.we plant hydrangea flower in acidic soil and in basic soil

It will by be burnt

15.we connect distilled water To electricity according to conduction

No connection as distilled water are bad electric conductors

Question 05 Choose the correct answer

1. Which of the following is the correct arrangement of the hardness of sodium (Na), magnesium (Mg), and aluminum (Al)?

a) Na > Mg > Al.
b) Mg > Na > Al
c) Al > Mg > Na.
d) Al > Na > Mg

2. The bronze alloy is formed by adding a small percentage of metal (X) to metal (Y). Which of the following identifies the metals (X) and (Y)?

a) (X): Copper, (Y): Tin.
b) (X): tin, (Y):copper
c) Lithium(x)
d) Chlorine (y)

4. Which of the following oxides, when dissolved in atmospheric water vapor, produces acid rain?

a) SO_2.
b) CaO.
c) Na_2O.
d) MgO

5. What is the molecular formula of the acid secreted by the stomach and participates in food digestion?

a) HBr.
b) HCl.
c) H_2SO_4.
d) HNO_3

6. The ion present in lemon juice that causes the color change in the litmus strip is:

a) NH_4^+.
b) OH^-.
c) H^+.
d) NO_3^-

7. Which of the following properties is NOT a characteristic of graphite?

a) It is brittle.
b) It is a bad electrical conductor.
c) It is black in color.
d) It does not have metallic luster.

8. What is the common property of both sodium and copper?

a) Color.
b) Density.
c) Melting point.
d) Physical state

9. The compound HBr in its gaseous state is known as:

a) Hydrogen bromide.
b) Hydrobromic acid
c) Bromide hydride.
d) Hydrobromide acid

10. Which of the following substances are acids?

a) Lemon and baking soda. b) Soap and toothpaste

c) Ketchup and grapes. d) Detergents and ketchup

11. When hydrochloric acid (HCl) reacts with sodium hydroxide (NaOH), the formed salt is:

a) NaCl. b) Na_2O. c) H_2O. d) $NaCl_2$

12. What is the similarity between metals and nonmetals?

a) They do not have metallic luster.

b) They are good conductors of heat.

c) They are malleable, ductile, and formable.

d) The last energy level in their atoms is not filled with electrons.

13. On dissolving calcium oxide in water and placing two litmus strips in the solution, the color of one of them changes into:

a) Red. b) Purple. c) Blue. d) Yellow

14. The alkaline solution which is poured into clogged drains to clear them is likely to be:

a) HCl. b) H_2O. c) NaOH. d) H_2SO_4

15. Which of the following questions helps classify elements as metals or nonmetals?

a) Is it solid? b) Is it colored? c) Is it liquid? d) Is it brittle?

16. Which of the following atomic groups carries the same charge as the hydroxide group?

a) Ammonium. b) Nitrate. c) Sulphate. d) Phosphate

17. If the hardness of sodium (Na) on the hardness scale is 0.5, then the hardness of aluminum (Al) is:

a) 0.1. b) 0.25. c) 0.5. d) 2.75

18. Each of the following expresses the compound H_2S, except:

a) It is known as hydrogen sulfide in its gaseous state.

b) It is known as hydrosulphuric acid in its solution form.

c) Its cation carries two positive charges.

d) Its anion carries two negative charges.

19. The correct name of H_2SO_3 acid is:

a) Sulfuric acid. b) Hypochloric acid

c) Sulfurous acid. d) Hypochlorous acid

20. All the following are harmful impacts of acid rain, except:

a) Destruction of forests. b) Corrosion of buildings.

c) Destruction of the human digestive system. d) Death of aquatic organisms.

21. Which of the following is a property of sodium hydroxide?

a) It dissolves in water, producing H^+ ions.

b) Its aqueous solution turns blue litmus strip to red.

c) Its solution reacts with hydrochloric acid forming salt and water.

d) Its solution reacts with lithium hydroxide solution forming salt and water.

22. The red litmus strip turns blue when placed in each of the following, except:

a) Oven cleaner. b) Ketchup. c) Toothpaste. d) Baking soda solution.

23. What is the substance that dissolves in water and turns it into an alkaline solution?

a) MgO. b) NO_2. c) SO_3. d) CO_2

24. Which of the following elements is a liquid with metallic luster?

a) Mercury. b) Bromine. c) Lithium. d) Chlorine

25. The ion whose percentage in the solution increases when an acidic oxide dissolves in water is:

a) H^+. b) OH^-. c) Na^+. d) Cl^-

26. If the anion which composes the acid HClO is called hypochlorite, then the acid is called:

a) Hypochlorous acid. b) Perchloric acid.

c) Hypochloric acid. d) Chlorous acid.

27. Which of the following is NOT a property of solid sodium hydroxide?

a) It dissolves in water and reacts with HCl acid.

b) It dissolves in water and does not react with HCl acid.

c) It does not dissolve in water and does not react with HCl acid.

d) It does not dissolve in water and reacts with HCl acid.

28. The molecular formula of hydrochloric acid is:

a) HCl. b) HClO. c) $HClO_2$. d) $HClO_3$

29. Which of the following is the correct formula for an oxyacid?

a) H_2O_3S. b) H_2S. **c) H_2SO_3.** d) H_2O_2

30. Each of the following acids is strong, except:

a) Nitric acid. **b) Acetic acid.** c) Sulfuric acid. d) Hydrochloric acid.

31. Each of the following is a weak electrical conductor, except:

a) Ammonium hydroxide. **b) Sodium hydroxide.**

c) Sulfurous acid. d) Nitrous acid.

32. The compound used in antacids is:

a) $MgCl_2$. **b) $Mg(OH)_2$.** c) NaCl. d) H_2SO_4

33. Among the basic oxides is:

a) SO_2. b) SO_3. c) H_2CO_3. d) Na_2O

34. All the following are properties of alkalis, except:

a) They contain OH^- ions.

b) They turn red litmus strip to blue.

c) They can react with sodium hydroxide solution.

d) They can react with hydrochloric acid solution.

35. The structures of all the negative atomic groups you have studied include:

a) Hydrogen element. b) Nitrogen element.

c) Oxygen element. d) Sulfur element.

36. Carbonate and sulfate groups are similar in:

a) Charge and number of elements only.

b) Charge and number of atoms only.

c) Number of elements and number of atoms only.

d) Charge, number of elements, and number of atoms.

37. All the following are oxides produced from burning fossil fuels, except:

a) SO_3. b) Na_2O. c) NO_2. d) SO_2

38. When the pH value of a solution changes from 8 to 5, that means it was:

a) Acidic and becomes alkaline. b) Alkaline and becomes neutral.

c) Acidic and becomes neutral. d) Alkaline and becomes acidic.

39. Which of the following expresses the solution of HI acid, except:

a) Gas dissolved in water. b) It reacts with HCl acid.

c) It contains H^+ ions. d) It turns blue litmus strip to red.

40. A red litmus strip is placed in solution (1), and no change in color occurs. When placed in solution (2), it turns blue. Which of the following is correct?

a) Solution (1): Neutral, Solution (2): Acidic.

b) Solution (1): Acidic, Solution (2): Neutral.

c) Solution (1): Acidic, Solution (2): Alkaline.

d) Solution (1): Alkaline, Solution (2): Acidic..

41. The acid secreted by the stomach that participates in food digestion has the molecular formula:

a) HBr. b) HCl. c) H_2SO_4. d) H_3PO_4

42. Each of the following is a molecular formula of an alkali, except:

a) NaOH. b) $Mg(OH)_2$. c) H_2S. d) NH_4OH

43. The ion present in lemon juice that causes a color change in litmus strip is:

a) NH_4^+. b) H^+. c) OH^-. d) NO_3^-

44. The compound HBr in its gaseous state is known as:

a) Hydrogen bromide. b) Hydrobromic acid.

c) Bromide hydride. d) Iodine.

45. Which of the following acids is NOT correctly named?

a) HNO_3 – Nitric acid. b) HI – Hydroiodic acid.

c) H_2CO_3 – Carbonic acid. d) H_3PO_4 – Sulfuric acid.

46. When hydrochloric acid (HCl) reacts with sodium hydroxide (NaOH), the formed salt is:

a) $NaCl_2$. b) H_2O. c) Na_2O. d) NaCl.

The alkaline solution used to clear clogged drains is most likely:

47. Which of the following oxides, when dissolved in atmospheric water vapor, produces acid rain?

a) SO_2. b) CaO. c) Na_2O. d) MgO

48. All the following are harmful impacts of acid rain, except:

a) Destruction of forests. b) Corrosion of buildings.

c) Destruction of the human digestive system.

d) Death of aquatic organisms.

49. The alkaline solution used to clear clogged drains is most likely:

a) HCl. b) H_2O. c) NaOH. d) NH_4OH

50. Which of the following is NOT an acid?

a) Lemon juice. b) Baking soda. c) Ketchup. d) Vinger

Question 06 Compare between

1)Distilled water and sulphuric acid in term of hydrogen and in term of conduct electricity

Distilled water	Sulphuric acid
Neutral PH =7 Bad electric conductor	Acid PH <7 Good electric conductor

2)sodium and sulfur in term of (conduct electricity ,malleability , conduct electricity)

Sodium	Sulfur
Metal Good electric conductor Malleable Ductile Formable	Non metal Bad electric conductor not ductile, nonmalleable, no formable (brittle)

3) copper sulphate and nickel chloride according to color

Copper sulphate	Nickel chloride
Blue color	Green color

4) sulphurous acid and sulphuric acid in terms of

Molecular formula - Effect on litmus strip - Electrical conductivity

Sulphurous acid	Sulphuric acid
H_2SO_3 Turn blue litmus strip into red	H_2SO_4 Turn blue litmus strip into red

5) oxygen nonmetal and aluminum metal "In terms of: Physical state - Electrical conductivity".

Oxygen	Aluminum
Non metal Gas state Bad electric conductor	Metal Solid Good electric conductor

Question 06 Who was the scientist

1-Developed pH scale to differentiate between acidic, basic and neutral solutions SorenSorensen.

2- Clarified that acids are substances that dissolve in water and yield positive hydrogen ions H+, while alkalis are substances that dissolve in water and yield negative hydroxide ions OH

Arrhenius.

Question 08 Answer the question

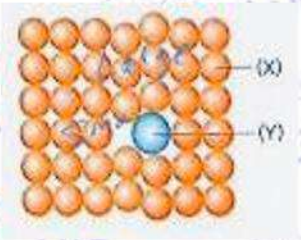
1) The opposite figure represents the composition of bronze alloy:

(1) What are the two elements (X) and (Y)

(2) Why are alloys preferred to use instead of pure metals?

Element (X): Copper.

Element (Y): Tin.



(2) Because alloys are harder than pure metals, which tend to be soft and often unfit for industrial uses.

2) The following two figures represent the electrical conductivity of hydrochloric acid and acetic acid at the same concentration

Identify the acid in each figure, with explanation.

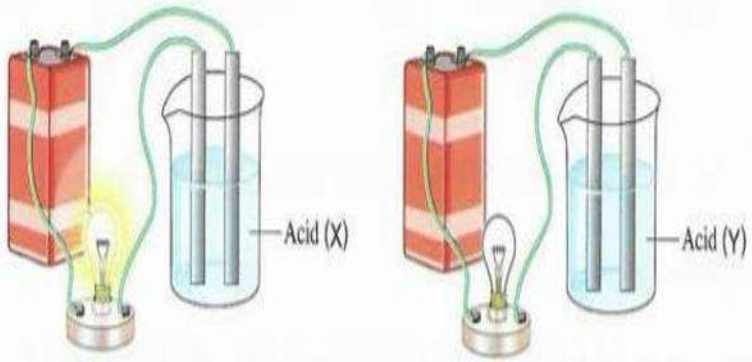


Figure (1) Figure (2)

(X): Represents hydrochloric acid, as it is a strong acid and a good electrical conductor.

(Y): Represents acetic acid, as it is a weak acid and a bad electrical conductor.

Question 09 Complete

1)strong acid are good electric conductor but weak acid are bad electric conductor .

2) alkali turn red litmus strips into blue color.

3) the color of nickel chloride is green But copper sulphate is blue color

3) the bronze alloy consist if copper by 98% and tin by 2%

4) the silver chloride salt is insoluble in water

5)Oven cleaner from alkaline substances, while bananas from acidic substances.

6) The only liquid metal is mercury while the only liquid nonmetal is bromine

7)graphite a good electrical conductor nonmetal and is used in the manufacture of dry cell

8)muscle cramps occur due to accumulation of lactic acid acid

9)sodium carbonate salts is soluble in water

10)the molecular formula of sulphuric acid is H_2SO_4

11)chlorine gas remove color of litmus strips

12) the example of basic gas is ammonia (NH_3)but acidic gas is CO_2 carbon dioxide

13)the dead sea has density 10 times more than red sea

14)the hydrangea flower accept red colour when grow in acidic soil


حمل الآن
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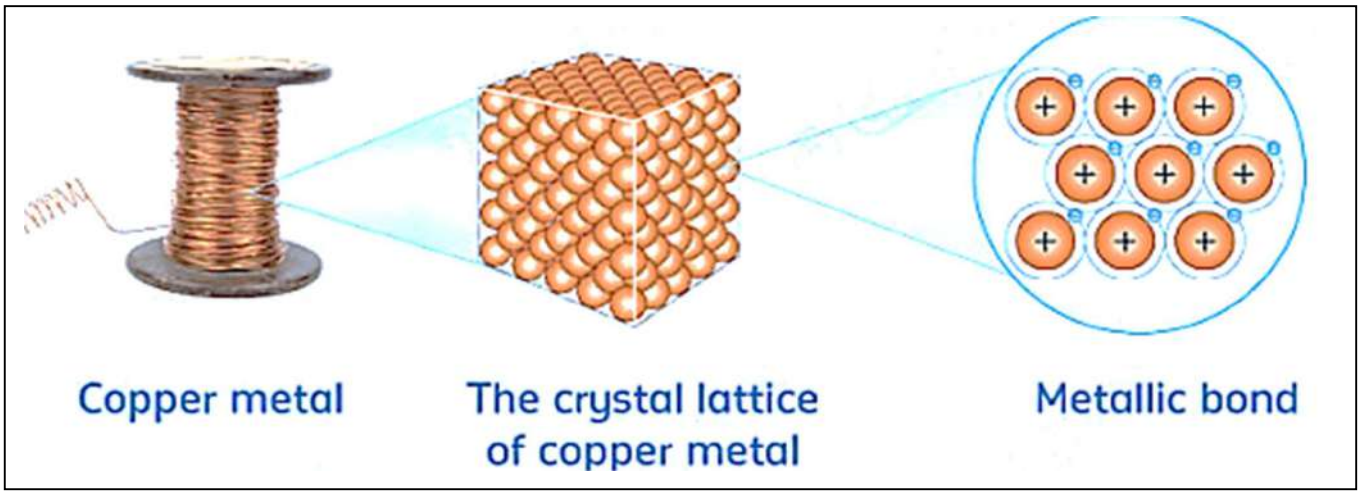
Unit 1: Chemical Substances
Lesson 1: Metals and Nonmetals

Metals and Nonmetals

Metals	Nonmetals
All metals are solids, except mercury which is liquid.	Nonmetals are either solids or gases, except bromine which is liquid.
The last energy level in most Metals contains either 1, 2 or 3 electrons.	The last energy level in most nonmetals contains either 5, 6 or 7 electrons.
Metals have metallic luster (shiny).	Nonmetals don't have luster (opaque).
Metals are ductile, malleable and formable.	Nonmetals are not malleable or ductile (brittle).
Metals are good electrical and heat conductors.	Nonmetals are bad electrical and bad heat conductors (except graphite (carbon) which is good electrical conductor and is used in dry cells).
Their melting points are high.	Their melting points are low.
Ex. sodium, copper, zinc and silver.	Ex. carbon, sulphur and phosphorus.

Metallic Bond

- The atoms of the solid metals are gathered in an arrangement known as metallic crystal lattice where they exist as cations (positive ions) surrounded by a cloud of free-moving valence electrons.
- Metallic Bond: is the attraction force between the positive metal ions and the negative valence electron cloud which surrounds them.
- The metallic bond is responsible for some physical properties of the metals such as metals hardness and their high melting points.
- The strength of metallic bond increases by increasing the number of valence electrons, so the hardness of metals and their melting points increase.



Alloys

- **Alloys are preferred to be used in industry instead of pure metals, because pure metals are soft, almost unfit for the industrial uses.**
- **<u>Alloys</u>: are mixtures composed of two or more molten metals, whose properties are differ from the properties of the elements forming it, and most of them are not expressed in molecular formulas.**

<u>Example: Bronze alloy</u>

- **Bronze alloy is composed of copper (95%) and tin (5%).**
- **It is characterized by being harder than copper, and it doesn't rust.**
- **It is one of the well-known alloys used in jewelry, medals and statues.**

Metal Recycling

- **<u>Recycling</u>: is the process of the conversion of the wastes into new usable substances.**
- **Some metals as copper, aluminum and iron are recycled for the following reasons:**

1) **Their percentage in the earth's crust decreases.**
2) **It is difficult to extract them from their ores.**
3) **Recycling metals is much cheaper than extracting them from their ores.**

Give reasons

1) **A piece of sulphur easily crumbles when hammered.**
   - **Because sulphur is a brittle nonmetal and not malleable.**
2) **A piece of copper can be easily shaped into various forms and is difficult to be fragmented when hammered.**
   - **Because copper is a metal which is malleable, ductile and formable.**
3) **Graphite is used in dry cells despite being nonmetal.**
   - **Because Graphite is the only good electrical conductor nonmetal.**
4) **Aluminum ($_{13}$Al) is harder and has a higher melting point than sodium ($_{11}$Na).**
   - **Because the strength of metallic bond between aluminum atoms is more than that between sodium atoms, as aluminum has more valence electrons than sodium.**
5) **Alloys are preferred to be used in industry instead of pure metals.**
   - **Because pure metals are soft, almost unfit for industrial uses, while alloys are harder and don't rust.**

Unit 1: Chemical Substances
lesson 2: Acids and Alkalis

Ions

- **Ion: is an atom that loses or gains electrons, and can be:**
  1) **Cation (positive ions): Metallic element ions.**
  2) **Anion (negative ions): Nonmetallic element ions.**
- **The hydrogen cation H^+ is the only positive ion produced from a nonmetallic element.**
- **All nonmetallic element ions end with the suffix (-ide).**
  - **Ex. Chlorine → Chloride (Cl^-).**

Atomic group (polyatomic ion)

- **Atomic group: is an ion composed of more than one atom of more than one element.**
- **The atomic group carries a number of positive or negative charges.**

Atomic group	Formula
Sulphate	SO_4^{2-}
Sulphite	SO_3^{2-}
Phosphate	PO_4^{3-}
Ammonium	NH_4^+

Atomic group	Formula
Hydroxide	OH^-
Nitrate	NO_3^-
Nitrite	NO_2^-
Carbonate	CO_3^{2-}
Bicarbonate	HCO_3^-

Types of chemical compounds

- **Chemical compounds are classified into:**
  1) **Acids.** 2) **Alkalis.** 3) **Oxides.** 4) **Salts.**
- **The total charge of a molecule of any compound is equal to zero because the number of positive charges equal to the number of negative charges.**

First: Acids

- **Acids: are substances that dissolve in water and give positive hydrogen ions (H^+). (according to the scientist Arrhenius)**
- **The acids are compounds resulted from the combination of positive hydrogen cation (H^+) with a negative anion which may be:**
  - **Negative atomic group [except hydroxide group $(OH)^-$].**
  - **Negative nonmetal ion (except oxygen).**
- **Number of hydrogen atoms in the acid molecule equals the magnitude of the charge of its anion.**

Names and molecular formula of acids:

1) **The molecular formula of the acid begins with the symbol of hydrogen cation (H^+).**
2) **The name of the acid end with the word "acid" and is related to the name of the anion which composes it as following:**
   a) **The name of acids which don't contain oxygen element begin with a word composed of the prefix "Hydro" followed by the name of the anion with replacing the suffix (–ide) with the suffix (–ic).**
      - **Ex. Hydrochloric acid (HCl).**
   b) **The name of acids whose atomic group contain oxygen element (oxyacids) begin with the name of the atomic group anion with replacing:**
      - **The suffix (–ate) with the suffix (–ic), ex. Nitric acid (HNO_3).**
      - **The suffix (–ite) with the suffix (–ous), ex. Nitrous acid (HNO_2).**

The importance of acids in our life:

- **Acids play important roles in human body, among them are:**
  1) **Hydrochloric acid: which is secreted by the stomach and participates in food digestion.**
  2) **Lactic acid: which provides the muscles with energy during their lack of oxygen, but its accumulation in the muscles causes muscle cramps.**
- **There are many acidic substances used in home such as lemon, ketchup and grapes.**

Formula of acid molecule	Anion	Name of the compound in gaseous state	Name of the compound in solution form
HCl	Chloride Cl^-	Hydrogen chloride	Hydrochloric acid
HBr	Bromide Br^-	Hydrogen bromide	Hydrobromic acid
H_2S	Sulphide S^{2-}	Hydrogen sulphide	Hydrosulphuric acid

Anion	Formula of acid molecule	Name of acid
Nitrate NO_3^-	HNO_3	Nitric acid
Nitrite NO_2^-	HNO_2	Nitrous acid
Sulphate SO_4^{2-}	H_2SO_4	Sulphuric acid
Sulphite SO_3^{2-}	H_2SO_3	Sulphurous acid
Phosphate PO_4^{3-}	H_3PO_4	Phosphoric acid

Properties of Acids

1) **Acid is a substance that when dissolves in water, the percentage of H^+ cations in the solution increases, which are responsible for all the properties of the acids such as the effect on blue litmus strip.**
   - **Acid solution turns blue litmus strip to red.**
2) **Acids conduct electricity to variant degrees according to their strength:**
   - **<u>Strong acids</u>: are good electrical conductors such as hydrochloric acid, nitric acid and sulphuric acid.**
   - **<u>Weak acids</u>: are bad electrical conductors such as vinegar (dilute acetic acid), sulphurous acid and nitrous acid.**
3) **Acids don't react with each other.**

Second: Alkalis

- **Alkalis are substances that dissolve in water and give negative hydroxide ions (OH^-). (according to the scientist Arrhenius)**
- **Alkalis are compounds resulted from the combination of negative hydroxide ion with a positive cation which may be:**
  - **Positive atomic group.**
  - **Positive metal ion.**

❖ **Number of hydroxide groups in the alkali molecule equals the magnitude of the charge of its cation.**

❖ **<u>Names and molecular formula of alkalis</u>:**

1) **The molecular formula of the alkali ends with the formula of hydroxide anion (OH^-) ,**
2) **The name of the alkali is related to the name of the cation which composes it, where:**
   - **The name begins with the name of the cation, followed by the word hydroxide.**

Cation	Formula of alkali molecule	Name of alkali
Sodium Na^+	NaOH	Sodium hydroxide
Magnesium Mg^{2+}	$Mg(OH)_2$	Magnesium hydroxide
Ammonium NH_4^+	NH_4OH	Ammonium hydroxide

❖ **<u>The importance of alkalis in our life</u>:**

- **Milk of magnesia is used as a temporary treatment for neutralize the gastric acidity, as it contains magnesium hydroxide $Mg(OH)_2$.**

❖ **There are many alkaline substances used in home such as cleaners, toothpaste and baking soda.**

Properties of Alkalis

1) **Alkali is a substance that when dissolves in water, the percentage of OH^- anions in the solution increases, which are responsible for all the properties of the alkalis such as the effect on red litmus strip.**
   - **Alkali solution turns red litmus strip to blue.**
2) **Alkalis conduct electricity to variant degrees according to their strength:**

- **<u>Strong alkalis</u>: are good electrical conductors, Ex. sodium hydroxide.**
- **<u>Weak alkalis</u>: are bad electrical conductors, Ex. ammonium hydroxide solution.**

3) **Alkalis don't react with each other.**

Reaction of Acids with Alkalis

- Acids react with alkalis forming salts and water.
- Ex. the reaction of hydrochloric acid (HCl) with sodium hydroxide solution (NaOH) forming sodium chloride salt (NaCl) and water H_2O.

Third: Oxides

- **Oxide**: is a compound formed when element burns in the presence of oxygen.
- **Oxides are classified into 2 types**:
  1) Metal oxides: are mostly known as basic oxides.
  2) Nonmetal oxides: are mostly known as acidic oxides.

Metal oxides	Nonmetal oxides
Oxides produced from the burning of metals in the presence of oxygen. (Basic oxides: Metal oxides, some of which dissolve in water forming alkalis)	Oxides produced from the burning of nonmetals in the presence of oxygen. (Acidic oxides: Nonmetal oxides that dissolve in water forming acids)
Ex. magnesium burning forms magnesium oxide MgO, which dissolves in water forming magnesium hydroxide solution $Mg(OH)_2$.	Ex. sulphur burning forms sulphur trioxide SO_3, which dissolves in water forming sulphuric acid solution H_2SO_4.
Metal oxides can react with acids, but they don't react with alkalis.	nonmetal oxides can react with alkalis, but they don't react with acids.

Acid rains

- **Acid rains: rains formed when acidic oxides, as nitrogen dioxide NO_2 and sulphur dioxide SO_2, dissolve in the water vapour of the atmospheric air, and accumulate in the clouds.**
- **Acidic oxides resulted from burning of fossil fuels (such as petrol and coal) in cars, power stations (power plants) and factories.**
- **harmful impacts of acid rains:**
  1) **They cause destruction of forests.**
  2) **They harm the living organisms which live in water.**
  3) **They cause corrosion of buildings.**
  4) **They cause health problems in the human respiratory system.**

Give reasons

1) **The molecular formula of magnesium hydroxide $Mg(OH)_2$ includes two hydroxide groups.**
   - **Because the magnesium cation carries 2 positive charges, and the number of hydroxide groups in the alkali molecule equals the magnitude of the charge of its cation.**
2) **Acids turn blue litmus strip to red.**
   - **Because they contain hydrogen cation which is responsible for all the properties of the acids.**
3) **Hydrochloric acid is a strong acid, while acetic acid is a weak acid.**
   - **Because hydrochloric acid is a good electrical conductor, while acetic acid is bad electrical conductor.**
4) **Sodium hydroxide can be differentiated from ammonium hydroxide by using electrical conductivity.**
   - **Because sodium hydroxide is a good electrical conductor, while ammonium hydroxide is bad electrical conductor.**

Unit 1: Chemical Substances
Lesson 3: Chemical Indicators and salts

Indicators

- We cannot identify chemicals like acids and alkalis solutions by tasting or smelling, because some acids are burning, and some alkalis are caustic.
  - Ex. Adding concentrated sulphuric acid to the table sugar causes it to be charred (becomes black).
- Differentiation between acids, alkalis and neutral substances (as distilled water) is accomplished by using chemicals known as indicators.
- Indicators: they are substances whose colour differs in acidic medium from that in alkaline medium.
- Examples of chemical indicators:
  1) Litmus indicator. 2) Universal indicator.

First: Litmus Indicators

- Litmus indicator is used in the composition of the litmus strips.
- The colour of litmus strips changes according to the type of medium, as follows:

In an acidic medium	In an alkaline medium	In a neutral medium
The colour of the blue strip turns red.	The colour of the red strip turns blue.	The colour of the two litmus strips doesn't change.
Due to the effect of H^+ cations.	Due to the effect of OH^- anions.	As the number of H^+ cations in it equals the number of OH^- anions.
Ex. hydrochloric acid (HCl).	Ex. sodium hydroxide solution (NaOH).	Ex. distilled water (H_2O).

- Litmus indicator cannot be used to differentiate between strong acids and weak acids as it gives the same colour with both of them.

Second: Universal Indicators

- The universal indicator is one of the most famous chemical indicators, which is found in form of strips or dyes.
- <u>The universal indicator</u>: is an indicator that can differentiate between acids and alkalis, or between different acids, or different alkalis, according to their strength.

Testing the acidity and the basicity of the gases

- The indicator strips must be wet with water during testing the acidity or basicity of gases, to dissolve them, where the indicators act only in aqueous medium.
- <u>Gases may be</u>:

1) Acidic gases: change the colour of the blue strip into red, such as carbon dioxide gas (CO_2).
2) Basic gases: change the colour of the red strip into blue, such as ammonia gas (NH_3).
3) Gaseous elements as (H_2, O_2 and N_2) don't change the colour of the indicator, except chlorine gas (Cl_2) which removes the colour of the two litmus strips (bleaching).

Agriculture Sciences and Life Application

1) The colour of the flowers of Hydrangea plant differs according to the type of the soil, where:
   - The flowers acquire red colour when they grow in acidic soil.
   - The flowers acquire blue colour when they grow in basic soil.
2) Acidic soil is treated by adding basic substances to it, such as calcium hydroxide $Ca(OH)_2$.
3) <u>Red cabbage indicator</u>: can be prepared from red cabbage plant and used to identify the acidity (colour turns red), the basicity (colour turns greenish) or neutralization (colour unchanged) of some liquids in house.

Potential of Hydrogen (pH)

- The chemist Soren Sorensen developed pH scale to differentiate between acidic, basic and neutral solutions.
- Potential of Hydrogen (pH): is a scale ranges between the values 0 to 14, used to determine the acidity and the basicity of solutions.
- The pH value of the neutral solutions and distilled water is 7, while for acids and alkalis varies as follows:

Acids	Alkalis
The pH value is less than 7.	The pH value is more than 7.
The strength of the acidic solution increases as its pH value approaches zero (0).	The strength of the alkaline solution increases as its pH value approaches 14.
Ex. Gastric acid, Lemon, Grapes, Tomato, Banana, Milk.	Ex. Egg, Baking soda, Hand soap, Ammonia solution, Bleach, Oven cleaner.

Tools used to measure pH value

- The pH value of solutions can be measured using:

1) pH meter device: This device determines the pH value of any solution directly and accurately, as the pH value is displayed immediately on the device's digital screen.
2) Universal indicator strips: These provide an approximate measuring of the pH values of the solutions:
   - by comparing the colour of the strip (after being dipped in the solution whose pH is required to be measured) with the indicator scale provided with the box, where each colour in this scale represents a definite pH value.

- Life application:

- The pH values of hair and skin care products varies.
- Example: pH of a dry hair shampoo differs from that of oily hair shampoo.

Salts

- **Salts: are ionic compounds produced from the reaction of the acids with the alkalis, as it is formed by the combination of a cation of an alkali with an anion of an acid.**
- **Salts can be formed by the combination of a cation (positive metal ion or positive atomic group) with an anion (negative nonmetal ion except oxygen or negative atomic group except hydroxide group).**

❖ Naming and molecular formula of salts:

1) **Naming of the salt begins with the name of the cation followed by the name of the anion.**
2) **The molecular formula of the salt begins with the symbol (or formula) of the cation followed by the symbol (or formula) of the anion.**
3) **When the same atomic group is repeated in the molecular formula of the compound, it is written between brackets, and the number of its repetitions below it.**
4) **The total charge of the salt equals zero.**

Salt Name	Cation	Anion	Molecular Formula
Sodium bromide	Na^+	Br^-	$NaBr$
Magnesium chloride	Mg^{2+}	Cl^-	$MgCl_2$
Sodium sulphide	Na^+	S^{2-}	Na_2S
Sodium carbonate	Na^+	CO_3^{2-}	Na_2CO_3
Calcium sulphate	Ca^{2+}	SO_4^{2-}	$CaSO_4$
Magnesium carbonate	Mg^{2+}	CO_3^{2-}	$MgCO_3$
Ammonium chloride	NH_4^+	Cl^-	NH_4Cl
Ammonium sulphate	NH_4^+	SO_4^{2-}	$(NH_4)_2SO_4$

Properties of Salts

❖ **Salts are similar in some properties such as:**

1) Salts are solid substances.
2) Salts solutions (salts dissolved in water) and their melts (molten salts) conduct electricity (just like solutions of acids and alkalis).
3) Solid salts don't conduct electricity (similar to distilled water).

❖ **Salts differ in some properties such as:**

1) Colour. 2) Solubility in water. 3) pH value of their solutions.

First: Colour

❖ Salts are classified according to their colour into:

1) **White salts**: such as zinc sulphate salt ($ZnSO_4$) and sodium carbonate salt (Na_2CO_3).
2) **Coloured salts**: such as the blue copper sulphate salt ($CuSO_4$) and the green nickel chloride salt ($NiCl_2$).

Second: Solubility in water

❖ Salts are classified according to their solubility in water into:

Soluble salts	Insoluble (sparingly soluble) salts
Salts that dissolve in water forming solutions.	Salts that do not dissolve in water.
Such as: 1) All sodium, potassium, ammonium and nitrate salts. 2) Copper sulphate ($CuSO_4$). 3) Nickel chloride ($NiCl_2$).	Such as: 1) all carbonate salts (except sodium, potassium and ammonium carbonate salts). 2) Silver chloride ($AgCl$). 3) Calcium sulphate ($CaSO_4$).

Third: pH value of salt solutions

❖ Salt solutions are classified according to their pH value into:

1) Acidic solutions. 2) Neutral solutions. 3) Alkaline solutions.

Acidic solutions	Neutral solutions	Alkaline solutions
pH less than 7 (pH < 7).	pH equal to 7 (pH = 7).	pH more than 7 (pH > 7).
Ex. ammonium chloride solution (NH_4Cl).	Ex. sodium chloride solution (NaCl).	Ex. sodium carbonate solution (Na_2CO_3).

Salinity of the Dead Sea

- Salinity of the Dead Sea is the highest in the world, it is almost 10 times higher than that of the Red sea.
- The high percentage of salts found in water of the Dead Sea leads to increasing the density of this water, so it is not possible to drown in it.

Give reasons

1) The blue litmus strip turns red when dipped in hydrochloric acid.
   - Due to the effect of hydrogen cations.
2) Neutral solution (distilled water) doesn't affect both red and blue litmus strips.
   - Because the number of H^+ cations equals the number of OH^- anions.
3) It is not possible to differentiate between hydrochloric acid and acetic acid by using litmus strips.
   - Because it gives the same colour with both of them.
4) Oven cleaner is a basic substance, while milk is an acidic substance.
   - Because the pH value of the oven cleaner is greater than 7, while the pH value of milk is less than 7.
5) The acidity of grapes is stronger than that of tomatoes.
   - Because the pH value of grapes is lower than pH value of tomatoes.
6) The alkalinity of laundry bleach is stronger than that of baking soda.
   - Because pH value of bleach is more than pH value of baking soda.

المراجعة رقم (4)

اختبار شهر فبراير

February Revision

Mr. Ahmed Elbasha

(1) Write the scientific term:

1)	Elements that have metallic luster and are good conductors of heat and electricity.	(.....)
2)	A nonmetallic element that is a good conductor of electricity.	(.....)
3)	The attraction force between positive metal ions and the negative valence electron cloud which surrounds them.	(.....)
4)	A mixture composed of the melts of two metals or more.	(.....)
5)	An ion composed of more than one atom of more than one element.	(.....)
6)	A substance whose dissolution in water leads to an increase in the percentage of H^+ cations in the solution.	(.....)
7)	A substance whose dissolution in water leads to an increase in the percentage of OH^- anions in the solution.	(.....)
8)	Metal oxides, some of which dissolve in water forming alkalis.	(.....)
9)	Nonmetal oxides that dissolve in water forming acids.	(.....)
10)	Rains which result from the dissolution of acidic oxides in the atmospheric water vapor.	(.....)
11)	Chemical substances whose colour differs in acidic medium from that in alkaline medium.	(.....)
12)	An indicator that can differentiate between the different acids or the different alkalis according to their strength.	(.....)
13)	A scale ranging between the values 0 to 14, and used to determine the acidity and the basicity of solutions.	(.....)
14)	A device used to measure the pH value of solutions directly and accurately.	(.....)
15)	Compounds, mostly ionic, formed from the combination of an alkali cation with an acid anion.	(.....)

✸(2) Choose the right answer:

1. What is the similarity between metals and nonmetals ? .....

a. They do not have metallic luster.
b. They are good conductors of heat.
c. They are malleable, ductile and formable.
d. The last energy level in their atoms is not filled with electrons.

2. All the following are properties of graphite, except that it .....

a. is brittle. b. is a bad electrical conductor nonmetal.
c. is black in colour. d. does not have metallic luster.

3. The liquid element that has metallic luster is .....

a. mercury. b. bromine. c. lithium. d. chlorine.

4. The bronze alloy is formed by adding a small percentage of metal (X) to metal (Y). Which of the following identifies the metals (X) and (Y)?

a. (X): Copper, (Y): Tin. b. (X): Copper, (Y): Sulphur.
c. (X): Sulphur, (Y): Copper. d. (X): Tin , (Y): Copper.

5. Which of the following is the correct arrangement of the hardness of sodium 11Na, magnesium $_{12}$Mg and aluminum $_{13}$Al?

a. Na> Mg> Al b. Al> Mg> Na
c. Mg> Na >Al d. Al> Na> Mg

6. The last energy level of metal atoms contains .....

a. 1 : 3 electrons. b. 3 : 5 electrons.
c. 5 : 7 electrons. d. 8 electrons.

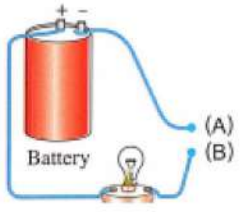
7. Which of the following represents pure silver element ?

a. Soft, conducts heat, opaque. b. Conducts heat, has metallic luster, brittle.
c. Soft, conducts heat, has metallic luster. d. Conducts electricity, opaque, brittle.

8. The liquid element which is bad conductor of heat and electricity is .....

a. bromine. b. chlorine. c. mercury. d. lithium.

9. In the opposite electrical circuit : Which of the following substances, when connected to the points (A) and (B), will light the bulb?



a. Graphite and sulphur. b. Sulphur and copper.
c. Graphite and aluminum. d. Graphite and bromine.

10. The hardest element of the following is .....

a. $_{13}$Al b. $_{17}$Cl c. $_{12}$Mg d. $_{11}$Na

11. Copper is a component of the bronze alloy, its percentage is .....

a. 5% b. 15% c. 65% d.95%

12. Which of the following atomic groups carries the same charge as hydroxide group?

a. Ammonium. b. Nitrate. c. Sulphate. d. Phosphate.

13. The combination of hydrogen with each of the following nonmetals produces acids, except .....

a. chlorine. b. bromine. c. oxygen. d. iodine.

14. Element (X) forms the oxide XO which reacts with acids. Which of the following represents (X) and XO ?

a. (X): Metal, XO: Acidic oxide. b. (X): Nonmetal, XO: Acidic oxide.
c. (X): Metal, XO: Basic oxide. d. (X): Nonmetal, XO: Basic oxide.

15. On dissolving calcium oxide in water, and placing two litmus strips in the solution, the colour of one of them changes into .....

a. red. b. purple. c. blue. d. yellow.

16. All the molecular formulas of the following ions are correct, except .....

a. sulphate SO_4^{2-} b. phosphate PO_4^{3-}
c. hydride OH^- d. nitrite NO_2^-

17. The molecular formula of hydrochloric acid is .....

a. HCl b. HClO c. $HClO_2$ d. $HClO_3$

18. The correct name of H_2SO_4 acid is .....

a. sulphuric acid. b. hypochloric acid.
c. sulphurous acid. d. hypochlorous acid.

19. Acids can contain the following atomic groups, except .....

a. carbonate group. b. sulphate group.
c. nitrate group. d. hydroxide group.

20. Which of the following substances are acids ? .....

a. Lemon and baking soda. b. Ketchup and grapes.
c. Soap and toothpaste. d. Detergents and ketchup.

21. The ion which is responsible for the acidic properties is .....

a. NH^+ b. O_2^- c. H^+ d. OH^-

22. Each of the following expresses the solution of HI acid, except .....

a. gas dissolved in water. b. it turns blue litmus strip to red.
c. it reacts with HCl acid. d. it contains H^+ ions.

23. Dissolving sulphuric acid H_2SO_4 in water produces .....

a. H^+ cations and SO_3^{2-} anions. b. H^+ cations and $S_2O_3^{2-}$ anions.
c. H^+ cations and S^{2-} anions. d. H^+ cations and SO_4^{2-} anions.

24. All the following acids are strong, except .....

a. nitric acid. b. acetic acid.
c. sulphuric acid. d. hydrochloric acid.

25. The compound which is used in antacids is .....

a. $MgCl_2$ b. $Mg(OH)_2$ c. H_2CO_3 d. NaO_2

26. Among the basic oxides is .....

a. SO_2 b. SO_3 c. NaO_2 d. Na_2O

27. All the following are properties of alkalis, except .....

a. they contain OH^- ions.
b. they turn red litmus strip to blue.
c. they can react with sodium hydroxide solution.
d. they can react with hydrochloric acid solution.

28. When hydrochloric acid HCl reacts with sodium hydroxide NaOH, the formed salt is .....

a. $NaCl_2$ b. H_2O c. Na_2O d. NaCl

29. pH value of a solution is changed from 8 to 5, that means it was .....

a. acidic and becomes alkaline. b. acidic and becomes neutral.
c. alkaline and becomes neutral. d. alkaline and becomes acidic.

30. Among the basic gases is .....

a. NH_3 b. O_2 c. H_2 d. CO_2

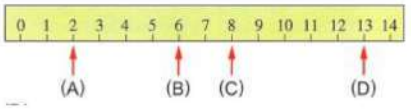
31. On dissolving CO2 gas in water, a solution is formed that changes the colour of the universal indicator strip. What is the type of the formed solution, What is the ion which causes the colour change in the indicator?

a. Acidic, OH^- b. Alkaline, OH^-
c. Acidic, H^+ d. Alkaline, H^+

32. The solution with pH equals 1 is .....

a. strong alkali. b. weak alkali.
c. strong acid. d. weak acid.

33. The opposite figure shows the pH values of four different solutions. The strongest alkali is .....



a. (A). b. (B).
c. (C). d. (D).

34. pH of acid rains can be equals .....

a. 5 b. 7 c. 9 d. 11

35. Which of the following substances are acidic ? .....

a. Bleach and hand soap. b. Bananas and tomatoes.
c. Milk and eggs. d. Lemon and baking soda.

36. The following substances have pH greater than 7, except .....

a. oven cleaners. b. calcium hydroxide solution.
c. ammonia solution. d. grape juice.

37. The combination of Mg^{+2} cation with $CO3^{2-}$ anion, forms .....

a. an acid. b. an alkali. c. an oxide. d. a salt.

38. Ca^{2+} ions combine with $PO4^{3-}$ ions forming a salt its molecular formula is .....

a. $CaPO_4$ b. $Ca_2(PO_4)_3$
c. $Ca(PO_4)_2$ d. $Ca_3(PO4)_2$

39. The correct name of the compound $(NH4)_3PO_4$ is .....

a. ammonium phosphide. b. ammonium phosphate.
c. nitrogen phosphide. d. nitrogen phosphate.

40. Which of the following substances dissolves in water, producing a solution its pH is less than 7?

a. Calcium carbonate. b. Sodium carbonate.
c. Silver chloride. d. Ammonium chloride.

✹(3) Put (√) or (X) :

1. Lithium and sulphur can be differentiated by electrical conductivity. ( )
2. Sodium is a soft metal with a melting point lower than that of nonmetals. ( )
3. Sulphur is used in dry cells. ( )
4. Bromine is a liquid element with metallic luster. ( )
5. Pure gold metal is harder than gold alloys. ( )
6. Symbol of aluminum cation is Al^{+3},while formula of ammonium group is NH_4^{3-} ( )
7. The molecular formula of nitric acid is HNO_3, while the molecular formula of sulphuric acid is H_2S ( )
8. When lithium hydroxide dissolves in water, the percentage of OH^- cations in the solution increases. ( )
9. Milk of magnesia contains MgO ( )
10. Sulphur oxides dissolve in atmospheric water vapour, forming basic rains that cause the corrosion of buildings. ( )
11. The number of H^+ ions equals the number of OH^- ions in distilled water. ( )
12. Acidic soil is treated with adding basic substances to it such as HCl ( )
13. The strength of the acidic solution increases as its pH value approaches 14 ( )
14. $CuSO_4$ salt is green in colour and dissolves in water. ( )
15. Sodium carbonate salt Na_2CO_3 dissolves in water, forming a solution its pH value is 7 ( )

✹(4) Complete the following:

1. The ..... elements are bad conductors of heat and electricity, except ..... which is a good conductor of electricity.
2. ..... are characterized by being ductile, malleable and formable, while ..... are characterized by being brittle (not ductile or malleable or formable).
3. As the number of valence electrons of the metal atom increase, the strength of its metallic bond .....
4. ..... group has a positive charge.
5. The molecular formula of an acid begins with the symbol of ..... cation, while the molecular formula of an alkali ends with the symbol of ..... anion.
6. Hydrobromic acid is composed of ..... cation and ..... anion.
7. Lemon is ....., while the grease cleaner is .....
8. When acids dissolve in water, the percentage of ..... cations in the solution increases, while when alkalis dissolve in water, the percentage of ..... anions increases.
9. ..... is a strong alkali, while ..... is a weak acid.
10. Oxides are divided into ..... oxides and ..... oxides.
11. The dissolution of ..... oxides in water forms acids, while the dissolution of ..... oxides in water forms alkalis.
12. When an acid reacts with an alkali, ... and ..... are produced.
13. Carbon dioxide gas changes the colour of the ..... litmus strip to ..... colour.
14. The strength of the alkaline solution increases as the pH value approaches ....., while the strength of the acidic solution increases as the pH value approaches .....
15. A change in the pH value of a solution from 3 to 7 means that it was ..... and become .....
16. The name of any salt begins with the name of the ..... followed by the name of the ..... which forms it.
17. The molecular formula of nickel chloride salt is .....

✹(5) Give reasons for:

1. **The melting point of magnesium is higher than that of sodium.**

   .....

2. **Magnesium $_{12}$Mg is a metallic element, while sulphur $_{16}$S is a nonmetallic element.**

   .....

3. **Graphite is used in dry cells despite being a nonmetal.**

   .....

4. **Aluminum $_{13}$Al is harder and has a higher melting point than sodium $_{11}$Na**

   .....

5. **Alloys are preferred to use in industry instead of pure metals.**

   .....

6. **The bronze alloy is used in jewelry and statues instead of copper metal.**

   .....

7. **The total charge of the molecule of any compound equals zero.**

   .....

8. **It is possible to distinguish between acids and alkalis by using litmus strips.**

   .....

✹(6) What happens when:

1. A piece of sulphur is hammered.

.....

2. The number of valence electrons in metal atoms increases "In order to: Their melting points".

.....

3. A metal melt is added to another metal melt.

.....

4. Calcium hydroxide $Ca(OH)_2$ dissolves in water.

.....

5. Hydrogen chloride gas HCI dissolves in water.

.....

6. A red litmus strip is placed in a beaker containing sodium hydroxide solution.

.....

7. Magnesium burns in the presence of oxygen, then the product dissolves in water.

.....

8. Sulphur burns in the presence of oxygen, then the product dissolves in water.

.....

9. Acids react with alkalis.

.....

10. Fossil fuels burn in factories and cars.

.....

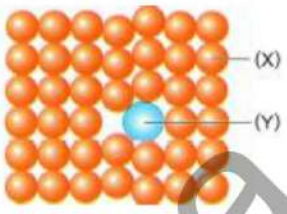
11. Sulphur and nitrogen oxides dissolve in the water of the rains.

.....

✹(7) Problems:

1 Study the following figures, then answer the questions:

1. The opposite figure illustrates the composition of the bronze alloy:



(1) What are the elements (X) and (Y) ?

(2) Why are alloys preferred to be used more than the pure metals ?

2 Cross out the odd out:

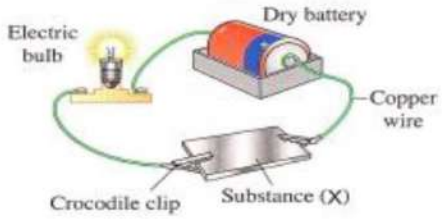
1. Magnesium / Copper/ Mercury/ Silver.
2. Hydrochloric acid / Acetic acid / Carbon dioxide gas /Ammonia gas.
3. H_2 / Cl_2 / O_2 / N_2
4. Sodium hydroxide / Baking soda /Vinegar/ Hand soap.
5. HBr / H_2O / H_2CO_3 / HNO_3
6. Lemon / Baking soda / Ketchup / Grapes.
7. HNO_3 / HBr / NaOH / H_2SO_4
8. $Ca(OH)_2$ / CO_2 / KOH / $Mg(OH)_2$

3 In the opposite figure:

What happens to illuminate the bulb, with explanation when the substance (X) is replaced with each of the following :

(1) A piece of graphite.

(2) A piece of sulphur.



4 Write the molecular formulas of the salts composed of the cations and anions:

(1) K^+, PO_4^{3-} ..... **(2)** Al^{3+} , SO_4^{2} .....

(3) NH_4^+, NO_3^- ..... **(4)** Mg^{2+} , CO_3^{2-} .....

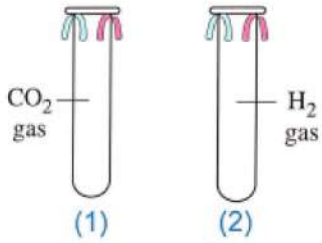
(5) Na^+, Cl^- ..... **(6)** Ba^{2+}, CO_3^{2-} .....

(7) NH_4^+, Cl^- ..... **(8)** NH_4^+ , PO_4^{-3} .....

(9) Mg^{2+}, SO_4^{2-} ..... **(10)** Ag^+, Cl^- .....

5 Study the following figures, then answer the questions:

From the two opposite figures :



(1) What happens to the litmus strips wetted with water in tube (1) ?

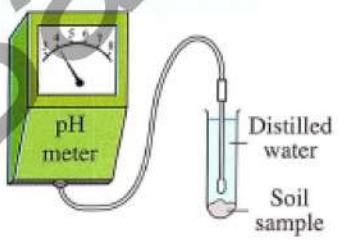
What can be concluded from that ?

(2) What is the effect of H_2 gas on the wetted litmus strips in tube (2)?

State the names of two other gases that have the same effect.

(3) What happens when H_2 gas in tube (2) is replaced with chlorine gas Cl_2 ?

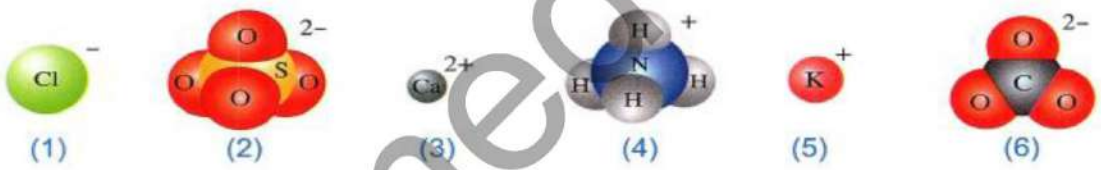
6 The device illustrated in the opposite figure is used to measure the acidity or basicity of agricultural soil :



1. What is the type of this soil? Explain.

2. How can this soil be treated ?

7 The following figures illustrate the ions of some elements and atomic groups:



Write the name and the molecular formula of the salt resulting from the combination of:

1. Ion (1) with Ion (5).

2. Ion (3) with Ion (2).

3. Ion (6) with Ion (4).

8 Write the names of the following acids and alkalis :

1. H_2CO_3 .....

2. HF .....

3. $Mg(OH)_2$ .....

4. LiOH.....

5. H_2SO_4.....

6. NH_4OH .....

9 Give one example for each of the following :

1. A negatively charged atomic group. .....
2. A strong acid. .....
3. An atomic group with a charge of -2 .....
4. An oxyacid. .....
5. A weak acid. .....
6. A strong alkali. .....

10 Write the chemical formula for each of the following:

1. Hydrobromic acid. .....
2. Nitric acid. .....
3. Lithium hydroxide. .....
4. Carbonic acid. .....
5. Sodium hydroxide. .....

Model Answer

✹ (1) Write the scientific term:

1. Metals
2. Graphite
3. Metallic bond
4. Alloy
5. Atomic group
6. Acids
7. Alkali
8. Basic oxide
9. Acidic oxide
10. Acidic rains
11. Indicator
12. Universal indicator
13. pH
14. pH meter
15. salt

✹(2) Choose the right answer:

1. d	8. a	15. c	22. c	29. d	36. d
2. b	9. c	16. c	23. d	30. a	37. d
3. a	10. a	17. a	24. b	31. c	38. d
4. d	11. d	18. a	25. b	32. c	39. b
5. b	12. b	19. d	26. d	33. d	40. d
6. a	13. c	20. b	27. c	34. a	
7. c	14. c	21. c	28. d	35. b	

✹(3) Put (√) or (X) :

1. (√)
2. (X)
3. (X)
4. (X)
5. (X)
6. (X)
7. (X)
8. (√)
9. (X)
10. (X)
11. (√)
12. (X)
13. (X)
14. (X)
15. (X)

✹(4) Complete the following:

1. Nonmetal - graphite
2. Metals – nonmetals
3. Increase
4. Ammonium
5. H^+ - OH^-
6. H^+ - Br^-
7. Acid – alkali
8. H^+ - OH^-
9. Sodium hydroxide – acetic acid
10. Acidic – basic
11. Nonmetal (acidic) – metallic (basic)
12. Salt – water
13. Blue – red
14. 14 – 0
15. Acid – neutral
16. Cation – anion
17. $NiCl_2$

✹(5) Give reasons for:

1. Because As the number of valence electrons in the metal atom increases, the strength of its metallic bond also increases and melting point increase.
2. Because $_{12}Mg$ contain two electrons in the outermost energy level , while 16S contain six electrons in outermost energy level.
3. Graphite is the only good electrical conductor nonmetal.
4. Because As the number of valence electrons in the metal atom increases, the strength of its metallic bond also increases and hardness increase.
5. Because alloy is harder than pure metals.
6. Because bronze alloy is more resistant to rusting.
7. Because The number of hydroxide groups in the alkali molecule **equals** the magnitude of the charge of the cation (or the atomic group) that composes it.
8. Because acid turns blue litmus paper into red , and alkalis turns red litmus paper into blue.

✹(6) What happens when:

1. The piece of sulphur crumbles easily
2. The melting point will increase
3. It will form alloy
4. It forms alkaline solution
5. It forms acidic solution
6. The red litmus strip changes into blue
7. It forms magnesium oxide (Basic oxide) which dissolves in water and form alkaline solution.
8. It forms Sulphur oxide (acidic oxide) which dissolves in water and form acidic solution.
9. It will form salt and water.
10. It produces acidic gases such as NO2 and SO2 which dissolve it water vapour and form acidic rains.
11. It forms acidic rains.

✹(7) Problems:

1	**(1)** * **Element (X):** Copper. * **Element (Y):** Tin. **(2)** Because alloys are harder than pure metals, which tend to be soft and often unfit for industrial uses.	**2**	**1.** Mercury **2.** Ammonia gas. **3.** Cl_2 **4.** Vinegar **5.** H_2O **6.** Baking soda **7.** NaOH **8.** CO_2
3	**(1)** The bulb remains lit/ Because graphite is a good conductor of electricity. **(2)** The bulb goes out/ Because sulphur is a bad conductor of electricity.	**4**	**1.** K_3PO_4 **2.** $Al_2(SO_4)_3$ **3.** NH_4NO_3 **4.** $MgCO_3$ **5.** NaCl **6.** $BaCO_3$ **7.** NH_4Cl **8.** $(NH_4)_3PO_4$ **9.** $MgSO_4$ **10.** AgCl
5	**(1)** The blue litmus strip turns to red / This indicates that carbon dioxide gas has an acidic effect. **(2)** It does not affect the colours of the litmus strips / Oxygen gas (O_2), Nitrogen gas (N_2). **(3)** The colours of the litmus strips disappear.	**6**	**1.** acidic soil – because pH is less than 7 **2.** by adding alkaline substance.
7	**(1)** * Element ions: (1), (3), (5). * Atomic group ions: (2), (4), (6). **(2)** 1- Potassium chloride/ KCl 2- Calcium sulphate / $CaSO_4$ 3- Ammonium carbonate / $(NH_4)_2CO_3$	**8**	**1.** Carbonic acid **2.** Hydrofluoric acid **3.** Magnesium hydroxide **4.** Lithium hydroxide **5.** Sulphuric acid **6.** Ammonium hydroxide
9	**1.** OH^- **2.** HCl **3.** $SO4^{-2}$ **4.** HNO_3 **5.** Acetic acid **6.** Sodium hydroxide	**10**	**1.** HBr **2.** HNO_3 **3.** LiOH **4.** H_2CO_3 **5.** NaOH

المراجعة رقم (5)

اختبار شهر فبراير

Question 1: Choose the correct answer

1. Element (X) its boiling point is 2807°C and its melting point is 1064°C

Which of the following is a property of element (X)?

a) Bad electrical conductor.
b) Ductile.
c) Brittle.
d) Opaque.

2. What is the common property of both sodium and copper?

a) Colour.
b) Density.
c) Physical state
d) Melting point

3. The last energy level of metal atoms contains

a) 1: 3 electrons.
b) 5: 7 electrons.
c) 3: 5 electrons.
d) 8 electrons.

4. Which of the following represents pure silver element?

a) Soft, conducts heat, opaque.
b) Conducts heat, has metallic luster, brittle.
c) Soft, conducts heat, has metallic luster.
d) Conducts electricity, opaque, brittle.

5. The liquid element which is bad conductor of heat and electricity is
   a) bromine.
   b) chlorine.
   c) mercury.
   d) lithium.
6. The metallic bond exists between
   a) atoms of different metals.
   b) positive ions and negative ions.
   c) atoms of the same metal.
   d) atoms of metals and hydrogen
7. The strength of the metallic bond increases with the increasing the number of the.....
   a) protons in the nucleus.
   b) energy levels.
   c) Valence electrons
   d) neutrons in the nucleus.
8. The structures of all the negative atomic groups which you have studied include
   a) hydrogen element.
   b) nitrogen element.
   c) oxygen element.
   d) sulphur element

9. Acids can contain the following atomic groups except
   a) Carbonate group
   b) nitrate group.
   c) sulphate group.
   d) hydroxide group.
10. Which of the following substances are acids ?
   a) Lemon and baking soda.
   b) Soap and toothpaste
   c) Ketchup and grapes.
   d) Detergents and ketchup.
11. All the following acids are strong, except
   a) nitric acid.
   b) acetic acid.
   c) sulphuric acid.
   d) hydrochloric acid.
12. The compound which is used in antacids is
   a) $MgCl_2$
   b) $Mg(OH)_2$
   c) H_2CO_3
   d) NaCl
13. Among the basic oxides is
   a) SO_2
   b) SO_3
   c) NO_2
   d) Na_2O

Question2: Put (✔) or (x)

1. Pure gold metal is harder than gold alloys.
2. Sulphur is used in dry cells.
3. Magnesium is harder than sodium because the number of valence electron in magnesium is less than that in sodium.
4. Bromine is a liquid element with metallic luster.
5. The bicarbonate and nitrate groups are similar in the number of atoms and the charge.
6. The stomach secretes lactic acid which participates in the food digestion.
7. Acids and alkalis conduct electric current to variant degrees depending on their strength.
8. Milk of magnesia contains MgO
9. Sulphur oxides dissolve in atmospheric water vapour, forming basic rains that cause the corrosion of buildings.

Question3: **Give reasons**

1. Graphite is used in dry cells despite being a nonmetal.
2. A piece of sulphur easily crumbles when hammered, while it is difficult to fragment a piece of iron.
3. The molecular formula of magnesium hydroxide includes two hydroxide groups.
4. Hydrochloric acid is a strong acid, while acetic acid is a weak acid.
5. Acid rains have severe harmful impacts on human and the environment

Question4: **Write the scientific term**

1. A nonmetallic element that is a good conductor of electricity.
2. The attraction force between positive metal ions and the negative valence electron cloud which surrounds them.
3. A mixture composed of the melts of two metals or more.
4. An ion composed of more than one atom of more than one element.
5. An acid formed in the muscles of the body during their lack of oxygen, causing muscle cramps.
6. A substance whose dissolution in water leads to an increase in of OH anions in the solution.

Question5: Define

1. Metal recycling.
2. Basic oxides
3. Metallic bond
4. Atomic group
5. Potential of Hydrogen pH
6. universal indicators

Question6: Give one example of

1. Strong acid
2. Weak alkali
3. A negatively charged atomic group
4. An oxyacid
5. An atomic group with a charge +1
6. A Blue colored salt
7. A Soluble salt

Question 7: Write the chemical formula of the following compounds

1. Lithium hydroxide
2. Carbonic acid
3. Hydrobromic acid
4. Sulphuric acid
5. Magnesium hydroxide
6. Aluminum sulphate
7. Silver chloride

Question8: Write the name of the following acids and alkalis

1. HCl
2. H_2SO_4
3. NH_4OH
4. HNO_2
5. $MgCl_2$

6. K3PO4
7. NH4NO3

Question9: You have two test tubes one contains an acid and the Other contains an alkali:

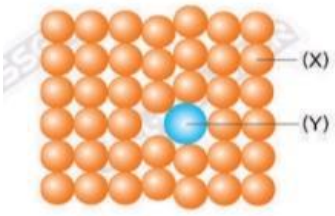
1. What is the name of the ion that characterizes each of them?
2. How can you differentiate between them by using litmus strip?
3. What is the result of the reaction between the contents of the two test tubes?

Question10: The opposite figure illustrates the composition c the bronze alloy:

What are the elements (X) and (Y)?

Why are alloys preferred to be used more than

the pure metals?



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4. Bromine is a liquid element with metallic luster. F
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7. Acids and alkalis conduct electric current to variant degrees depending on their strength. T
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Because it is the only good electrical conductor nonmetal.

2. A piece of sulphur easily crumbles when hammered, while it is difficult to fragment a piece of iron.

Because sulphur is a brittle nonmetal while iron is a malleable ,ductile metal.

3. The molecular formula of magnesium hydroxide includes two hydroxide groups.

Because magnesium cation carries two positive charges and the number of hydroxide groups equals the magnitude of charge.

4. Hydrochloric acid is a strong acid, while acetic acid is a weak acid.

Because HCl is a good electrical conductor while acetic acid is a weak electrical conductor.

5. Acid rains have severe harmful impacts on human and the environment

It causes destruction of forests, corrosion of buildings and health problems in the human respiratory system.

Question4: **Write the scientific term**

1. A nonmetallic element that is a good conductor of electricity. Graphite
2. The attraction force between positive metal ions and the negative valence electron cloud which surrounds them. Metallic bond
3. A mixture composed of the melts of two metals or more. Alloys
4. An ion composed of more than one atom of more than one element. Atomic groups

5. An acid formed in the muscles of the body during their lack of oxygen, causing muscle cramps. Lactic acid
6. A substance whose dissolution in water leads to an increase in of OH anions in the solution. Alkali

Question5: Define

1. Metal recycling.

The process of the conversion of the wastes into new usable substances.

2. Basic oxides

Metal oxides, some of which dissolve in water forming alkalis.

3. Metallic bond

The attraction force between the positive metal ions and the negative valence electron cloud which surrounds them.

4. Atomic group

An ion composed of more than one atom of more than one element.

5. Potential of Hydrogen pH

A scale ranging between 0 to 14 used to determine the acidity and basicity of solutions.

6. universal indicators

An indicator that can differentiate between different acids and alkalis and based on their strength.

Question6: Give one example of

1. Strong acid — hydrochloric acid
2. Weak alkali — ammonium hydroxide
3. A negatively charged atomic group — phosphate group
4. An oxyacid — sulphurous acid
5. An atomic group with a charge +1 — ammonium group
6. A Blue colored salt — copper sulphate
7. A Soluble salt — nickel chloride

Question 7: Write the chemical formula of the following compounds

1. Lithium hydroxide — LiOH
2. Carbonic acid — H_2CO_3
3. Hydrobromic acid — HBr
4. Sulphuric acid — H_2SO_4
5. Magnesium hydroxide — $Mg(OH)_2$
6. Aluminum sulphate — $Al_2(SO_4)_3$
7. Silver chloride — AgCl

Question8: Write the name of the following

1. HCl hydrochloric acid
2. H2SO4 sulphuric acid
3. NH4OH ammonium hydroxide
4. HNO2 nitrous acid
5. MgCl2 magnesium chloride
6. K3PO4 potassium phosphate
7. NH4NO3 ammonium nitrate

Question9: You have two test tubes one contains an acid, and the Other contains an alkali:

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Acids characterized by H+ ion while alkalis characterized by OH- ion

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While alkalis change the color of red litmus paper into blue

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What are the elements (X) and (Y)?

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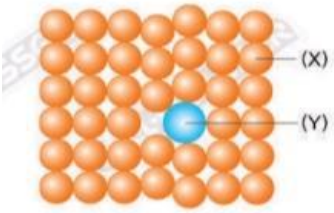

كيفية طباعة صفحات معينة من ملف معين

مثلا ازاى نطبع الصفحات من صفحة 4 الى صفحة 9